THE GENDERED SYMBOLISM OF OFFICE COMPUTERS ACROSS THREE GENERATIONS

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ABSTRACT

The computer has changed in form and function over the last 50 years. Once a sprawling mainframe, revered and fed data encoded in punched cards, it is now a multi function hand-held device used to share personal information with an anonymous audience. It is omnipresent in UK workplaces, fundamental to the majority of businesses and critical to administrative processes. But the computer is just a machine - or is it? This is a qualitative research study within a symbolic interactionist phenomenology using narrative to explore the meaning of the computer held by participants from three generational cohorts. The research concludes that the computer is more than just the sum of its component parts. The computer is a symbol of community, providing access to online social groups, enhancing female solidarity and supporting the development of international alliances. It means freedom and independence, is a lever for professional development and key to a fathomless vat of knowledge. It is also a symbol of oppression, a stifling force, invading private space, encroaching on the sanctity of the family home and seeping into leisure time. It represents the fragmentation of social groups and isolation of individuals as it disrupts social bonds and usurps physical connection. There are whiffs of male symbolism and, being a technological artefact, the computer parades as *a thing that men do*. However, the study finds *technology* is what happens behind the scenes, and it is the application of the computer that is engendered.

Symbolic interactionism theorises that we act and react with things according to the meaning we attach to them, and that meaning comes from how we see other people act/react. Thus it would follow that how we relate to the computer as a symbol is impacting on how we relate to each other.

DEDICATION

This is for Paul, who never stopped believing in me.

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1.0 INTRODUCTION

1.1 HISTORY

The computer is omnipresent, integral to the activities of a millions of UK workers, and critical to the role of office worker[1]. Its evolution has been recent, fast-paced and dramatic, morphing '...*from mathematical computation to information processing and finally to real-time control'* (Sackman, 1967, p23) in less than a century. With an unstilted development curve of exponential proportions, the computer is a 'transient, ephemeral, fleeting object'. Successive models are 'tossed into the dustbin of history' as new and improved combinations of *'clock speeds and chip sets, Floating Points and FORTRAN'* come into being (Atkinson, 2010, p.8). The computer's history is difficult to trace, and there is no universally agreed lineage (Atkinson, 2010, p.7). Plant (1998, p.116) identifies the first computer as a punch card system developed by Herman Hollerith who was working on the US census in 1890. The system was more than just a calculator because it was able to *'iterate repeatedly*' the same mathematical process (Goldstein, 1972, p.343). Malik (1975, p.22) defines an essential characteristic of the computer as the ability to hold instructions *'in the memory'*; the advent of the computer for Malik was not therefore until the middle of the 20th century when the digital computer was born. Sackman (1967, p.100) points to the SAGE air defence network, a project commenced in 1953, whilst Plant (1998, p.146) refers to the ENIAC machine of 1946 as the '*first fully electronic*

[1] In 2010, 95% of businesses had internet access (Office National Statistics, 2014a). Over 58% of employees, around 7.5 million people, used computers at work and a further 9% of employees accessed the internet via a 3G portable device at least once a week as part of their job (Office National Statistics, 2014b). In 2014, 73% of households had internet access. In 2018, that figure had risen to 90% (Office National Statistics, 2018c) with 86% of adults using the internet every day.

programmable computer'. The Colossus of Bletchley Park in 1943 is also a contender (Hicks, 2017, p.19).

The origins of the modern day computer are debatable, but the general consensus is that military imperatives provided the stimulation for developments within the electronics industry to bring about the genesis of the modern computer (Dinneen and Frick, 1977, p.1155). Malik (1975, p.31) describes reticence by IBM to get into the commercial arena, anticipating a market of just 6 machines, and it was the defence spending at the time of the Cold War that provided IBM with the incentive to progress development. IBM launched their 701 in 1953 and '*almost overnight IBM became committed to the computer business'* (Malik, 1975, p.57).

The commercial computer's initial impact was restricted to the worlds of physical scientists and accountants (Goldstein, 1972, p.344). However, the ability to encode instructions into a numerical form made computers as *'useful for sorting information as for multiplying numbers'* (p.345).

In the 1960's, local networks of hardware shared printers. In the 1970's, independent systems shared packets of information through the Ethernet (Crovitz, 2002). Then, in the 1980's, Tim Berners-Lee linked hypertext documents through an information system and the internet was born (Couldry, 2012, p.2).

Curiously, whilst the function of the computer has expanded to encompass a phenomenal range of applications, its size has reduced. The UNIVAC, a computer built to analyse the results of the American census *'occupied vast air conditioned rooms'* (Plant, 1998, p.33). That processing capability is now surpassed by the silicon chip, no bigger than a finger nail.

1.2 IMPACT

The Oxford University Press (2016) defines *computer* as:

> *'An electronic device which is capable of receiving information (data) in a particular form and of performing a sequence of operations in accordance with a predetermined but variable set of procedural instructions (program) to produce a result in the form of information or signals'.* Oxford University Press (2016)

The computer was conceived as an aid to complex calculations. Its functionality expanded to enable broader information processing, and more recently it has become a device to assist communication. It is now firmly embedded in our social rituals[2] and has become integral to our perception of our world as it augments, intercepts and reflects through virtual reality based systems. In a very short time, the computer has *'merged from the role of an anomaly to a necessity of many and at least a common place thing of others'* (Goldstein, 1972, p.346). Goldstein foresaw in the 1970's (p.347) the potential social impact of data banks cascading from emergent computer technology; 50 years on we have the World Wide Web, online shopping, social media, the concept of big data, data privacy and data ownership, along with successive attempts to regulate, control and contain[3]. The computer is associated with opportunities for some; others see the potential threats. Is it a friend? Or foe? Or is it just *'quickly orphaned husks of sand and plastic'* (Levy, 2000, p.13 quoted in Atkinson, 2010, p.8)?

Computers were introduced into the office environment at a time of radicalisation of a mainly female clerical workforce (Tepperman, 1976). The computer may have been perceived as an attempt to impose control (Barker and Downing,1980, p.84) and the radicalisation may have been fuelled by rejection of this subjugation. Alternatively, there

[2] In 2017, there were approximately 42 million UK Facebook users, 16 million UK Twitter users, 21 million LinkedIn users, 35.6 million UK visitors to YouTube each month and 14 million monthly active UK Instagram users (London School of Economics, 2017).
[3] For example, Data Protection Act 1998 and General Data Protection Regulations 2018.

may be no connection. Computerisation was presented commercially as an opportunity to streamline the workforce, create efficiencies and reduce costs (Spilker and Sørensen, 2003, p.229). Some argued that women were not being replaced in the office by the computer, but were instead being empowered by it (Pringle 1989, p.175). Brynin (2005) argues that the computer was a neutral tool for interaction, levelling the platform for career progression between the sexes. Weinberg (2000) argues that the computer made the workplace more accessible to women and women's wages increased as a result of computerisation. He also claims computers supported the professional development of women by releasing them from the shackles of domesticity by offering flexible solutions to the burden of childcare (Weinberg, 2000). After 50 years of computerisation, however, the gender pay gap of 9.6% (Duncan, MacIntyre and Davies, 2019) demonstrates that inequality persists in the office.

1.3 SYMBOLIC VALUE

In 1999, women were very much in the minority as students of computing in British universities, forming less than one-fifth of those studying computer science. Clegg and Trayhurn (1999) note that whilst the number of students enrolling on computer courses was increasing, the percentage of females was falling and this was an international theme. Women continue to exceed men in their participation in higher education (Weale, 2016) yet only 19% of higher education qualifications in computer science were obtained by women (UCAS, 2013). Clegg and Trayhurn (1999, p.77) suggest that whilst the computer world is multifaceted, and the sector is becoming more appreciative of traditionally feminine skills in the form of the hybrid worker, particular sections continue to be seen as masculine. Whilst it is accepted that the computer industry is a male dominated industry, the computer itself has become a vital tool within the office and the office is traditionally a

female domain[4]. If a tool arguably imbued with masculinity enters a feminised workplace, how does that impact?

For Ortner and Whitehead (1981, p.1) gender is a symbol *'invested with meaning by the society in question..'*. and one way to understand a gender symbol requires one to *'understand its place in a larger system of symbols and meanings'* (p.2). Gherardi (2015, p.593) talks about the influence of symbols, comprising the culture of an organisation, on the shared understanding of gender within that workplace, saying that gender is shaped by discourse but underpinned by a symbolic order: *'Gender is not just located at the level of interactional and institutional behavior (the gender we do), but at the level of deep and trans-psychic symbolic structures (the gender we think)*'. Oudshoorn, Saetnan and Lie (2002) argue:

> *'Biological sex differences are so minor that we need things to make 'the small difference' into a 'big difference'. Things that surround us embody gender codes. We hardly notice this because of the self-evident nature of the way in which ordinary things contribute to the construction of being a woman or a man'.* (Oudshoorn, Saetnan and Lie, 2002, p.475)

Lie (2003a, p.23) concurs saying *'Gender is a cultural category which permeates the symbol system'* present in how we speak, what we do and the design of things around us.

Whilst the computer may be a symbol of masculinity, it might alternatively have been engendered through the intensity of the relationship the user has with the device (Lœgran, 2003, p.219) . We know the computer is not a person (Nass and Moon, 2000, p.82) but still apply social rules and expectations to computers we work with. It is possible that we are drawing analogies between ourselves and the machines (Guthrie, 1993, p.78).

[4] 3,360 thousand people were employed in administrative and secretarial occupations in 2018. 2,543 thousand (76%) were female (Office National Statistics, 2018).

Tiedemann (1787, quoted in Murchison and Langer, 1927, p.229, quoted in Looft, William and Bartz,1969, p.12) says that this *animism* was '*due to the fact that one always envisages an unknown thing through one that is known;...now there is nothing nearer and more familiar to us than ourselves...'*. Guthrie writes (1993, p.127) *'Computers now are a special foci of personification. Male computers are practical jokers, poets, and lovers, are suicidal, and struggle for power with each other and with humans and female computers are'* quoting Bruner (1997) *'shy, sweet, gentle, respectful, and humble'*. Is the office computer a male or a female?

The abstract of Wajcman (2006) states that *'mastery over technology has long been seen as a key source of power for men'*. In our *'computer-serviced society'* (Sackman, 1967, p.35) with the World Wide Web providing a global information store, the computer is the gatekeeper of knowledge. If the computer, whether through its engendered symbolic representation or anthropomorphication, discourages and continues to discourage, subconsciously restrict and socially handicaps females in their access to knowledge, women will continue subordinate to men. However, Wajcman (2007, p.287) sees a change in mood amongst feminist writers over the latter part of the 20th century with what she terms '*second wave feminism*' initially *'generat[ing] a fatalism that emphasised the role of technology in reproducing patriarchy'* giving way to a more positive cyberfeminism with technology being seen as '*inherently liberatory for women'*.

It is clear that artefacts have meaning that extend beyond their form and function. This study contributes to the existing body of work exploring engendering of technology by focusing specifically on the symbolic meaning held by the computer for women office workers. Through the grouping of participants by generation, it considers how that meaning may have changed over the last 50 years. The findings may help explain the

persisting gender divide within the workplace and how computers enforce, or dismantle that divide.

1.4 RESEARCH QUESTION

Is the computer merely a machine that functions as instructed without bias or prejudice? Or is it a symbol of masculine dominance, a sinister instrument of oppression responsible in part for sustained gender inequality within the workplace? Or is it a symbol of something else?

This research asks:

- What is the symbolic meaning of the computer for women office workers?
- Has this symbolic meaning changed over the last 50 years?
- Is there a correlation between the symbolic meaning and age of the participant?

1.5 METHODOLOGY

This is a qualitative study utilising narrative as a tool with the intention of exploring the engendered symbolism of the computer in the workplace. It draws on studies into the social construction of technology and considers how social agents engender the computer. Society as a technological construction, and the possibility that the computer is an active agent in the suppression of women, is also explored. Additionally, consideration is given to the potential for the computer to hold meaning in excess of mere symbolic representation and be engendered by participants as a 'second self' (Turkle, 1984). This is against a symbolic interactionist phenomenology backdrop where objects are imbued with symbolic value as a consequence of our observed and re-enacted reaction and interaction.

1.6 ASSUMPTIONS

This study involves only those who identify as women. Participants were invited to interview if they considered they had spent 51% or more of their career in the office. The term *office* was not defined and how the 51% was calculated was not specified. It was assumed, however, that there was general consensus as to what the term *office* meant. The study looks at participants' relationship with the computer and assumes they share data honestly and openly without ulterior agenda.

1.7 LIMITATIONS

Whilst it focuses on the computer in the workplace, this study recognises that computers feature in multifarious aspects of life, accepting that experiences outside the workplace will be transmuted into the meaning encapsulated by the *computer* in the workplace.

This study is concerned specifically with the impact of the computer on women in the workplace. The focus is exclusively on the female experience. Although consideration is given to females' understanding of the male experience, any comparison is merely conjecture. However this conjecture is accepted as valid data, in that it provides further insight into the participant's perspective.

1.8 STRUCTURE

Following on from this introduction, in chapter 2 I review related literature, before explaining the methodology in chapter 3. A discussion of the findings in chapter 4 precedes a final chapter in which I discuss the conclusions drawn from the research and put forward ideas for further study.

2.0 LITERATURE REVIEW

2.1 INTRODUCTION

This study considers the meaning of the computer beyond the sum of its constituent parts. It seeks to identify its symbolic connotations, if any, and how these may have changed for women office workers over the last 50 years. The following is a review of literature supporting the premise that the computer is more than just a multifunctional device.

In this chapter, I consider the theoretical framework underpinning the computer as, firstly, a socially constructed product, and then as an active agent in cultural and social development through a technological construction and co-construction perspective. I then explore further the social construction paradigm and the ways in which the computer might be a passive engendered vestibule of symbolic meaning, through design, through practical application, and then specifically through male use. There follows consideration of the computer as an active agent in reaffirming the gender divide through its symbolic representation of male superiority and female subordination, and its part in replacing, deskilling, dividing and finally liberating the workforce. The final section considers the potential for the computer to have meaning beyond its symbolic connotations having assumed the persona of a separate entity, an independent engendered life form.

2.2 THE COMPUTER AS MORE THAN JUST AN ARTEFACT

2.2.1 The computer as a social product

The computer is, without the know-how to exploit its capability, useless (MacKenzie and Wajcman, 1985, p.3 cited in Webster, 1996, p.5). Computers are a form of technology. The term *technology*, however, is a broad one. Its etymological roots are

Greek and comprise a reference to art and skill (La Shun, 2017). For MacKenzie and Wajcman the term *technology* is also a *'slippery'* concept because it encapsulates not only objects, but the activities connected to those objects and '*what people know as well as what they do*' (1985, p.3). Lie (2003b, p254) says: *'Even though the concept of technology is understood as encompassing more than mere artefacts, what is special about technology is that knowledge and practice are, in a sense, 'forged' into objects'.*

Lie (2003a, p.21) defines technology as '*artefacts and types of knowledge which are shaped by cultural processes inherent in our social interaction, not only while the technology is being developed and produced, but also by its subsequent use and reputation'.* It could thus be argued that the computer comprises not just an assembly of electronic components with the capability to perform certain tasks, but also the skills and knowledge required to instruct it to perform, along with the processes and rituals that have evolved around its use. From this argument stems the idea that technology in general, and the computer specifically, is thus a product of society and more than just an item, being a composite of physical form, human activities and knowhow. It would follow, therefore, that the computer as a concept has modified and grown since its design through its mechanical evolution and use. Garud and Rappa (2009, p.346) concur saying technology has three basic definitions: beliefs, artefacts and evaluation routines, the sum of which provides a socio-cognitive model for technological evolution. As people observe each other reacting and interacting in the process of technological development, they attach meaning to an object. We react to and interact with things according to the meaning we attach to that thing, and this leads to a shared meaning. The object becomes a symbol of that shared meaning. This social construction approach to understanding technology is accredited to Bijker, Hughes and Pinch (1987). Webster (1996, p.26) described it as being

concerned with technological artefacts as social constructs, the outcome of negotiation between social actors, both human and non-human.

This builds on Bowker and Star (1999, quoted in Lie, 2003a, p.20) who highlight the role of gender in these relationships: *'In the cultural process of defining what [technology] is, how it should be used, what [technology] skills are, or in other words what 'counts' as valuable knowledge and skills, gender functions as a cultural category in 'sorting things out"*.

2.2.2 Society as a product of the computer

MacKenzie and Wajcman (1985, p.4) explain a theory of where technology is independent of society, but changes in technology drive changes in society. They argue that technology opens up various options, but a choice still has to be made, so it would be difficult to argue that technology is totally independent from society. Also, they question what actually shapes technology in the first place if it is independent of society: '*science, it is said, shapes technology - and science is something unaffected by the society in which it is conducted'*, but, they argue '*even the level of 'fact' - of experiment and observation - is social, and different groups of scientists in different circumstances have been shown to have produced radically different 'facts''.* MacKenzie and Wajcman (1985, p.4) say that technology and science are more interdependent and that *'technologists use science'* (p.9). They suggest that technology shapes technology and, quoting Ogburn and Thomas (1922), say that *'inventions were inevitable'*, given certain factors. They go on to say that '*typically, technological decisions are also economic decisions*' (p.14) and that *'much innovation is sponsored and justified on the grounds that it saves labour costs'* (p.17). Wajcman (2007, p.293, citing Bijker, Hughes and Pinch, 1987, Law and Hussard, 1999, and MacKenzie and Wajcman, 1999) claims that technology is '*a sociotechnical product'*

and the result of *'a seamless web or network combining artefacts, people, organizations, cultural meanings and knowledge*'.

The interdependency between technological innovations leads Garud and Rappa (2009, p.345) to observe that '*technological development must be studied contemporaneously'*. Cockburn and Ormrod (1993 cited in Lagesen, 2003a, p.70) elaborate on this concept and say that technology not only influences technological development, technology also influences society and the concept of gender held by that society, and thus gender and technology are co-constructed. An example is given by MacKenzie and Wajcman (1985, p.4) who point out that employers will seek out '*technological change'* to allow them to *'replace expensive unionised workers with cheaper and/or non-unionised female workers'*. They say it is because the investment is justified by a reduction in wages, *'technological change may be slower in industries where there is an abundant supply of cheap women's labour'* (p.18).

Sackman (1967, p.3) describes human evolution as '*being radically transformed and... driven in new and largely unknown directions at increasing speed by computer-catalyzed science and technology'*. He attributes the implications of technological innovation to the invention as much as to the social and political landscape in which it is born. He gives the example of the harnessing of steam power coming about soon after the birth of capitalism, with the commercial stimulus provided by the New World at a time of the division of labour in factories. The combined result, he claims, was the Industrial Revolution, which itself spawned ideological conflicts and social deprivation (p.20). Sackman sees technological developments as a product of the times, but also as a solution to contemporaneous needs with the trajectory of societal development aligned with the technology's potential. To exemplify, he says that the digital calculating machine, as

epitomised by the work of Charles Babbage (1792 -1872), was born into a world of new social sciences where the vain hope '*man might soon be able to understand and control his own behaviour*' was hit by the stark realisation that '*social systems were unmanageably complex and in a chronic state of rapid and unpredictable flux'.* (p.21) The desk calculator was mass produced from the mid 19th Century (p.25), but it was the keenness to reduce reality to empirical data and '*establishment of probabilistic reasoning*' (p.22) that fuelled technological developments in computerisation. A Hollerith electrical tabulating machine using punch cards was used to compile data from the 1890 American census (p.26) and it was vacuum tubes used by Vannevar Bush in 1925 (p.26) that spurred development of analogue computers towards IBM's electromechanical digital Automatic Sequence Controlled Calculator, aka Mark I, completed 1944 (p.27).

Oudshoorn, Saetnan and Lie (2002, p.417) argue that whilst objects are social agents, they are gendered by design and also by use and '*instructions, advertisements [and] associations with gendered divisions of labour also play a part in the engendering'*. Garud and Rappa (2009, p.344) confirm this argument when they describe '*a complex web of interactions between those who develop the technology, the physical artefacts they create, and the institutional environments they foster*'. Garud and Karnoe (2003) refer to those responsible for these interactions as *actors*. The actors may be a multiplicity of agents external to an organisation, or, as identified by Hosking and Morley (1991, p.12) internal to an organisation and aiming '*to protect and promote their values and interests*' within that organisation. Garud and Karnoe (2003, p.279, fig.2) suggest 4 categories of actors: those involved in the design/production, the regulation, the evaluation, and finally, the use, linked as a series with the use feeding back to design/production.

2.3 THE COMPUTER AS AN ENGENDERED PRODUCT

2.3.1 Engendered by 'institutional actors'

Cockburn and Ormrod (1993, p.20-33) identify a complex network of *'institutional actors [that] shape the consumer'* knowledge about technology including internal departments within the manufacturing company, marketing activity which draws on stakeholders interests, and external parties such as standard-setting authorities, home economist profession/teachers, test laboratories and advertising agencies.

In respect of advertising agencies, Dilevko and Harris (1997) found technology advertisements featured men more than women, with men being portrayed usually as deep thinkers, and women used to convey simplicity and ease of use. Weinstein (1998, p.88, quoted in Johnson, Rowan and Lynch, 2006, p.2) says: '*By portraying only men as actively engaged with the technology, an identification is established in which masculinity becomes the engagement.* ' Johnson, Rowan and Lynch (2006, p.3, citing Turner and Hovenden, 1997), found that most images of women in UK home computer magazines depicted '*confused and confusing women, bitchy and difficult women, or women as defaced, sexual objects*' whilst the '*men represented were working and powerful'*. Johnson, Rowan and Lynch (2006, p.3) say Weinstein (1998) found in his study of US home computing magazines that '*advertisements not only excluded women, but constructed technology differently for men than for women*'. In their own study in New Zealand, Johnson, Rowan and Lynch (2006, p.7) found a similar proportion of male to female representation, with only 1.5% of the advertisements featuring women in a position of power. Turner and Hovenden (1997, cited by Johnson, Rowan and Lynch, 2006, p.4) say that because advertisements show women as irrelevant to computers, women perceive computers as irrelevant to themselves.

Berg and Lie (1995, p.340) explore the idea that women fear technology because it '*destroys 'feminine' values*'. They say this is not the case, and that the issue is technology is designed with little thought to female needs or interests, because it is designed by men for use by men. Wajcman (2007, p.290) elaborates on this saying that women are not drawn to technology because: '*Technologies have a masculine image, not only because they are dominated by men, but because they incorporate symbols, metaphors and values that have masculine connotations*'. This, says Wajcman (2007, p.290) stems from '*male domination of the skilled trades*' during the industrial revolution with craft workers resisting the entry of women in order to protect their position. This exclusion of women led to technology being seen as a materialisation of social relations and '*socially shaped, but shaped by men to the exclusion of women'.* Gansmo, Lagesen and Sørenson (2003, p.59) consider the part played by designers in engendering technology, citing Berg (1996) and her study of smart houses with heating, lighting and equipment controlled remotely via the internet. They say the houses were conceived by male designers with an interest in technical gadgets who presumed others would be interested in gadgets. There was a failure to consider the domestic routine work normally undertaken by women. A further example is (Mieszkowski, 1999) a personal digital assistant or similar computerised hand held device designed by men to fit in the breast pocket of a man's shirt, or clip onto the belt of a man's trousers.

Wajcman (2006, p.8) says *'the history of technology still represents the prototype inventor as male'*. Freud (1933, quoted in Plant, 1998, p.23) says *'women have made few contributions to the inventions and discoveries of the history of civilisation'.* Cockburn (1985, p.25) says it is not so much that women have failed to achieve within technological fields, such as the computer industry, they merely failed to have been accredited with that

success. Cockburn (1985, p.25) goes on to say that the importance of technology relevant to female activities such as, for example, the baby bottle, have been underplayed. Berg and Lie (1995, p.337) note that *'Because of the sexual division of labor, women and men not only use different technologies but use the same kinds of technology differently*'. They found that men were predominant as technical designers and teachers, and if the concept of technology was big clunky greasy machines, then women were rarely involved. However, if the definition of technology is extended, for example, to include domestic equipment, women are much more evident. Griffiths (1988, p.147) suggests that '*...an activity becomes 'technology' when there is money to be made from it, or power to be gained by the exercise of it'*. Cockburn (1985, p.27, citing Rosenberg, 1982, p.35) says that the *'social process of technological development has been overwhelmingly a male process. It is women's lack of social and economic power that holds them 'down' to the role of producer of goods for immediate consumption*'. Cowan (1979) agrees saying that the female experience of technology as markedly different to that of men because:

1) There are technologies pertinent to women only;
2) The women worker is not considered a 'significant' component;
3) The women is the traditional incumbent of domestic responsibilities and experiences technology primarily as an end user; and
4) Women are socially conditioned to be 'antitechnocrats' - to express an interest in technology is to stand outside the boundaries of what is typically female.

Berg and Lie (1995) are clear in their conclusion that artefacts have gender, but the gender inscribed in artefacts is open to change. Lie (2003a, p.15) refers to both gender and technology as '*unstable constructions that are constantly changing*'. Webster (1996, p.26) concurs saying '*the construction of the artefact undergoes numerous iterations in*

numerous spheres of design and use as competing designs are interpreted, reinterpreted, applied, discarded and stabilised'. Webster suggests confining the focus to the initial stages of construction of an artefact as helpful from a gender-aware perspective because it is easier to identify the influences. Webter goes on to say, however, that it is a mistake to consider the social impact on technological developments as confined to the initial design stage as '*technological systems are crucially and sometimes radically reshaped while they are being implemented and used'*. The user's role in shaping technology is examined by Kline and Pinch (1996) who talk about how the farmers of America shaped the car. Pinch and Bijker (1984) review the development of the bicycle and how female users were disadvantaged by societal disfavour of women in trousers and the subsequent innovations to make the bicycle accessible to females.

2.3.2 Engendered by practical application

Lie (2003b) says that:

> *'To state that things have gender is a trick. Things cannot 'have' gender but we may 'give' them gender by making them soft or hard, clean or dirty, since we tend to interpret these qualities in gendered terms. In the same 'vein' people do not 'have' gender either, in the sense of something given by nature, but people are attributed gender by cultural conventions*' (Lie, 2003b, p.261).

Gansmo, Lagesen and Sørenson (2003, p.57) cite a study by Sorenson and Berg (1987) where students were asked to put various artefacts into gendered categories. It was found that: '*Small, clean artefacts tended to be classified as feminine, while big greasy, noisy ones were categorised as masculine'*. Gansmo, Lagesen and Sørenson concluded that this engendering was linked with an understanding of the types of tools a woman would use in her work and the types of tools used by a man.

An example of an object engendered by use is the typewriter. The typewriter was a common place office tool until it was replaced by the computer and as such is particularly

pertinent to this study. Davies argues (1982, p.55) that the typewriter was gender neutral on its introduction into the office, but the predication of women to the dexterity required for typing soon meant that it was sex typed. Davies (1982, p.55) says the claim to the typewriter by women was due also their higher tolerance of routine. Davies points out (1982, p.170) that the new technology was arriving at the same time as feminisation of the office: as it was new, there were no associations with the male dominated office of the latter part of the 19th century and this gender neutrality facilitated women's entry into the office. Pringle (1989, p.174) says it was not long before female and machine were synonymous and the term '*Lady Typewriter'* emerged. Pringle says the nimble fingers of the archetypal female were responsible for the close association between the typewriter and women. Benet (1972, p.39 cited in Barker and Downing, 1980, p.70) says it was assumed women could type because they could play the piano. However, Gardey (2001, p.213 cited in Craig and MacNeil, 2011, p.38) argues that the typewriter was introduced as a feminine tool. Gardey says the first typewriters were manufactured in premises used to manufacture sewing machines and had many similarities in construction and appearance. Craig and MacNeil (2011, p.38) therefore argue that by the time the typewriter appeared in the UK, it had an established history as feminine technology. This is reinforced by Davies (1982, p.35) who says Mark Twain talks about the demonstration of a typewriter to him before he made his first purchase in which the machine was operated by a 'type girl'. Davies (1982, p.54) gives the example of a Remington typewriter advertisement persuading the reader to buy a typewriter as a gift for a female as it would open up *'an easy avenue to profitable and suitable employment'*.

Research by Cockburn and Ormrod (1993, p.101) into the microwave demonstrates the gender of an artefact can change following its implementation and use, in line with a

change in the gender of its primary market. The microwave was originally aimed at the single male for warming up ready meals after a day at the office. It was *'an artefact at the cutting edge of technology'* and came onto the market as brown goods. Brown goods are a male domain; white are female. '*White seems to imply clean / simple / transparent / functional / vacuous. Brown seems to say complex / clever / obscure / challenging / contentful'*. The microwave gradually migrated towards the white goods area in electrical retail outlets as it became embedded in the psyche of the consumer as tool rather than a gadget until it became well and truly entrenched as another kitchen appliance (p.108). Cockburn and Ormrod (1993, p.156) say they '*saw the microwave oven shift from being a more or less masculine engineered product to being a 'family' white good, on the way to its anticipated home, a feminine kitchen environment'*. This transition came about, they say, through its '*positioning in the store and also by advertising, point-of-sale material, instruction booklets, the way it is spoken about, the sales pitch'*. Cockburn and Ormrod (1993) explain:

> '*Cooking as much as engineering is a technology... Yet the two processes are conceptually quite distinct. The word 'technology' has come to mean processes men typically create, control and use, not those that women characteristically do'*. (Cockburn and Ormrod, 1993, p.98).

Similarly, the gender of the target market for the computer has changed. In the seventies, data processors entered data into a main frame system. Those entering the data were usually female, and those designing the systems were usually men. Towards the end of the seventies, the microcomputer became more widely available. This was pitched as an *'executive workstation'* towards (male) managers (Tijdens, 1999, p.48). However, Lockheed (1985, p.116) observed that computers were being used by '*writers, scientists, choreographers [and] artists'*, users that were *'sensitive to deep human motives'* and many of whom were female. She noted that there were also a number of female computer

programmers, but *'recent data on sex differences in computer use at home and at school support the idea that our culture is defining computers as pre-eminently male machines*'. Lockheed discerned use of the computer as a tool to be as much, if not more, a female than male thing, for example, enrolling in word processing classes and sending emails. Shaffner (1993, cited in Webster, 1996, p.57) identified different gender associations for hardware and software, dependent on the users and application. Corneliussen (2003, p.111) carried out a study into the gender men associated with various computer related activities. Computer games and programming were masculine; HTML, the Internet, and spreadsheets were partly seen as masculine, partly as neutral. Only two activities - email and word processing - were not seen as masculine by any of the men, but rather regarded as neutral or feminine. Gansmo, Lagesen and Sørenson (2003, p.39) agree that the function of the computer has changed from technological innovation of the 1980's to general household equipment in the 1990s: *'Whilst it used to be a machine for programming, game playing and writing, it has become an instrument for communication and information gathering as well'*. They say, however, that *'it is not obvious how these changes... may have affected the symbolic interpretation of ICT*'.

Turkle (1997) refers to computing expertise during the 1970's as a technical understanding of the mechanics of the computer. Innovations in user interfaces and a increased utilisation of the computer as a means to communicate has more latterly placed the emphasis on the surface of the computer. This, suggests Turkle, has led to a corresponding shift in gender because of the understanding of communication as a feminine skill. Corneliussen (2003, p.110) concurs saying: *'While men are associated with technical knowledge of the computer, women are first and foremost assumed to have knowledge of how to use software'*. The shift in definition of computing expertise would in

theory make computing more accessible to women. Lie (2003a, p.15) says that this has not happened because: *'The problem with this conclusion is that it naturalises certain qualities as 'belong to' the female sex, at the same time as it freezes a certain definition of ICT'.* Pertinent to this argument are marketing campaigns sponsored in an effort to redress the gender imbalance within the ICT workforce. Lie (2003a, p.24) refers to marketing initiatives that have resorted to a strategy of making the computer industry less about technology and more about communication. Lie (2003a, p.25) says women's success with ICT is assessed by comparing what they do with what men do well. Men are considered to be more technical whereas '*women are deemed to be interested in chatting and email'.* Woodfield (2002 cited in Lagesen 2003, p.100) looked at a computer company who had focused on recruiting women to fill communication heavy roles: *'The female employees were expected to surpass men in the hybrid jobs where communication and ICT skills were to be combined'.* Lagesen says, however, that the communication skills for which the women were recruited were less valued than the technical programming skills of their male colleagues, and what was typically male was held as best. Corneliussen (2003, p.133) said that the engendering of computers as male domain was so pronounced that: '*...being a man may in itself function as a qualification, in order to be regarded as computer skilled'.*

Of relevance is research into adoption of Windows 95 by Chau and Hui (1998) which found early adopters of new technology to be primarily men and late adopters more likely to be female. Wajcman (2007, p.291) notes that early adopters of new technology are still mainly men, but a more positive relationship between women and technology has developed.

2.3.3 Engendered by its users - the 'computer geek'

Lagesen (2003, p.71) says: *'A symbolic relationship between masculinity and computing has been demonstrated in several studies, especially those with a focus on programming and computer games'.* This has been referred to as the '*hacker impact',* '*geek mythology'* (Margolis and Fisher 2003) or, metaphorically, by the idea of the *'boy's room'* (Gansmo et al, 2003). Lœgran (2003, p. 201) talks about the importance of context to the development of symbolic meaning, and says the internet cafe in her study was defined as much by users as the computers and how the computers were configured. Lœgran (2003, p. 204) states that: *'While the computer may have ambiguous gendered connotations in some contexts, it is seen mainly as a boy's toy in the leisure sphere'.*

There was an acceptance of a *'boy's room competence'* (Lie, 2003, p.13) during the latter part of the 20th Century which was held as an explanation of the more natural affinity of boys, rather than girls, to computers. This was believed to be as a result of informal learning between boys spending leisure time on computers. Lie accredits the term *'boy's room'* to Stuedahl (1997) who had written about courses being given to female students in order to bridge the technological knowledge gap between them and the male students. Corneliussen (2003, p.115) says: '*It is not unusual in advanced computer studies to assume that male students start their studies with certain basic skills in computing that women are assumed not to possess'.* Lœgran (2003, p.204) says that the value of the boy's room competence is not well defined as whilst boys using computers is commendable, boys using computers too much leads to a concern that an obsession with the computer might prevent acquisition of social skills and a stereotype of geek and nerd has been constructed to counter this. Lœgran (2003, p.205) refers to the popularity of LAN parties where young people were meeting at each others houses and playing on computers.

Although girls were involved, the events were mainly about boys and computers, thereby reinforcing the link between men and machine.

The relevance of the boys' room competence has arguably declined in recent years. Webster (1996, p.36) talks about changes in the computer industry over the preceding two decades: the introduction of the network manager, the difference between systems analysis and programming, and that the data entry jobs previously dominated by women having '*slid into obsolescence'*. There has, however, been a notable change in approach to programming which in theory is making the role of programmer more of an artist than of a scientist and therefore more sympathetic to the traditionally held competences of the female. Turkle (1997, p.52) says that the hard style of programming favoured during the 70's gave way to a softer style in the 80's because '*the computer culture's centre of gravity has shifted from programming to dealing with screen simulation"* Turkle says there is '*a new emphasis on visualisation and the development of intuition through the manipulation of virtual objects*'. This is a move in emphasis from abstract to concrete . Turkle says Female thinking is more concrete than abstract, thus making the computer more accessible to them, and also making people think of computers as female more than male.

Lockheed (1985) suggests a number of reasons why there are fewer female programmers including: programming is associated with maths and maths is for boys; programming requires competiveness and discipline, non-feminine characteristics; boys are more likely to have the necessary skills; girls are being excluded from IT at school; parents do not want their daughters to become programmers and wil not buy them computers; and girls do not get the support form their teachers that boys do. Further reasons given are sex stereotyping of computer games and game rooms, and because children perceive computers as a boy thing. However, Game and Pringle (1984

cited in Webster, 1996, p.144) explain the relative absence of women from the computer industry in terms of three broad reasons: computers represent power and control; sex-typed jobs and; the maths/science image of computers. Malik (1975, p.16) refers to the masculinisation of the maths/science image as a historic issue saying men were '*often philosophers, usually mathematicians, always practical engineers'.*

2.4 THE COMPUTER AS AN ACTIVE AGENT

2.4.1 Replacing the workforce

MacKenzie and Wajcman (1985, p.18) argue that technological change is spurred on by the need to reduce cost and remain competitive. Citing Cowan (1979), they say this might manifest as technology being introduced with a view to replacing *'expensive unionised workers with cheaper and/or non-unionised female workers'*. They go on to say that because a female workforce is a comparatively cheap workforce, technological change in spheres dominated by women are slower. Spilker and Sørensen (2003, p.229) note that computers were introduced as a means of reducing the size of the predominantly female office workforce and argued *'that the design of office computer systems reflected a misleading and suppressive image of many female jobs as low-skilled and easy to replace by computers'*. Conversely Hick (2017) argues that computer development in the civil service was initially fuelled by female machine operators. When the a link between computer prowess and power was identified, Hick claims the industry underwent a process of masculinisation carefully orchestrated by the Government as a mechanism of patriarchal control. The cost advantages of women and technology were being exploited by the civil service from the 1870s with the introduction of female clerks and typewriters. Hick (2017, p.75) claims, however, there was a power tangent to the engendering of roles and refers to

the Admiralty recruitment of men for relatively well paid teleprinter roles which were *'typewriters hooked up to transmission lines'*. Hicks says that although teleprinting was easier than typewriting the *'immediacy and expense'* meant that it was a more responsible role and therefore justified employment of higher paid men.

Tepperman (1976) says that the word processor, a computerised typewriter, has made the preparation of documentation in the office a more efficient process. The typewriter involved a wider variety of physical movements (e.g. carriage return and loading paper) in addition to the job satisfaction of reeling off the final letter. The design of the word processor means the wrist remains close to the keyboard, and the act of printing and posting might form part of a role separate to that of typist. As well as leading to more monotonous job content, computers, says Tepperman, because of the high capital investment involved, were spurring on employers to trim their workforces into leaner more efficient models. Job cuts were therefore being made in addition to those savings coming directly from automation, which were themselves sizeable. Tepperman (1976, p.47) says '*one executive estimated that 6.5 secretaries with magnetic-card typewriters could do the work of 22.5 secretaries with regular typewriters'*. Pringle (1989, p.185) refers to an estimate that one word processor could replace 25 typists. Nardi, Whittaker and Schwarz (2000) argue that women have been replaced by computers and high status jobs are still primarily occupied by men whilst new sex-typed low value roles have emerged for women in call centres.

It could be argued that efficiency savings in the clerical world were being introduced, prior to computerisation, in the 60's, with changes to acceptable letter layout, window envelopes and dictaphones (Pringle, 1989, p.181). In addition, Pringle (1989, p.182) refers to shortage of secretaries in the early 1970's, but says the subsequent

recession of 1974, and not computerisation, created pressure to make savings. Baldry (1997, p.371) says *'escalating costs of office labour and undercapitalisation* [following the hard automation of the 1960's] *had created a bottleneck in productivity'* which together with the *'oil crisis of 1973'* increasing office heating and lighting costs had produced a *'double crisis'*. The computer was seen as *'the cavalry coming over the hill'*. There was pressure to increase productivity and reduce labour costs. The computer made this possible.

2.4.2 Deskilling the workforce

Littlefield et al (1970, p.250, cited in Tepperman, 1976, p.45) says that by 1970 there were 63,000 computers in use by private companies. Tepperman (1976, p.45) refers to an American study by the Bureau of Labor Statistics, 1966, saying *'almost all banks and insurance companies used computers in their operations'*. With a typical word processor costing $8,000 (p.46), *'a return on investment could only be realised by the machines being operated continuously all day'*. Tepperman (1976, p.57) warned that the pressure for efficiency, which was epitomised by the computer, would lead to increasing specialisation of roles. However, rather than demanding high rates of pay, these new roles would be perceived as routine, standardised, low skilled, and therefore low paid.

Barker and Downing (1980, p.161) talk about the *'transformation of patriarchal relations of control by the move towards real subordination with the introduction of word processors into offices'*. They refer to the fragmentation of the typist's role by the introduction of the word processor. The word processor did a lot of the formatting of the document, and therefore required less skill to operate than a typewriter. Barker and Downing (1980, p.160) state that *'to learn the whole complex of operations which the word processor can perform would take a qualified typist 3 to 4 days. An unqualified typist*

could learn the most basic procedures in half a day'. Barker and Downing (1980) point out that:

> *'...conventional notions of skill and deskilling cannot be applied to a predominantly female labour process because the very fact of a job being labelled 'women's work' brings in enormous ideological determinations which enable its skill content 'somehow' to be devalued'*. (Barker and Downing, 1980, p.159)

The memory storage of a word processor meant that the operator could *'theoretically work continuously in front of a machine without ever needing to leave their seat'*, thus eroding some of the *'visible signs of resistance which are peculiarly feminine'* (p.147). Barker and Downing also refer to the gulf between the word processor operator carrying out the routine jobs and the *'Super Secretary'* (p160).

Tepperman (1976, p.23) quotes participants saying that inputting into the computers was like '*driving a big truck with standard, without automatic steering'* and that *'it really doesn't take much brains'*.

Wolff (1980, p.58) described technology as *'the antithesis of skill'* and suggested that whereas past technological advancements had been about a reduction in physical input, future advancements would lead to a reduction in intellectual activities. He also pointed out that whilst the level of intellectual capacity needed to operate technology would be much lower, there would be an increased requirement for people to carry out this type of work.

Cockburn (1985, p.11) observed that women were often employed to operate machinery, and whilst some jobs involving machinery required a greater skill level than others, women were rarely *'in those occupations that involve knowing about what goes on inside the machine...women may push the buttons but they may not meddle with the works'*. Cockburn (1985, p.13) suggests that the low numbers of women in technical careers is due

to *'a keen perception of the costs involved: isolation, discomfort, harassment and, often wasted time and energy'* saying that: *'Technology and the relations of technical work have to change before most women will choose to engage with [the pioneers]'.*

Lie and Rasmussen (1985, cited in Tidjens,1999) says that the detriment to women following computerisation of the office was not as extreme as feared. Buchanan and Boddy (1982, p.9) found the introduction of the word processor had *'reduced task variety, meaning and contribution to end-product'* and created jobs, albeit *'boring'* jobs, but not necessarily contributed to job losses. Crompton and Jones (1984, p.43) claim that *'clerical work had already been rationalised and broken down into its constituent elements before the introduction of the computer*' but accept that some saw computerisation as '*the final stage in the exorable deskilling of non-manual work'.* The impact of the computer on office work was unquestionably profound. Tidjens (1999, p.53) found 95% of female office users using VDU's in the early 1990's, whereas this had been merely 1% at the beginning of the 1970's. 72% used the computer for word processing, and 50% used it for two or more applications.

Reducing workforce numbers was not the only agenda of new technology. Garud and Rappa (2009, p.345) suggest on a macro level, the emergence of new technology was linked to attempts to either 'diminish *or enhance the value of a firm's existing human and capital investment'* saying that:

> '*Technology that diminishe[d] existing competencies was more likely to be introduced by newly created firms, while technologies that enhance[d] existing competencies [we]re more likely to be introduced by established firms'.*

2.4.3 Dividing the workforce

Littlefield et al (1970, p.250, cited in Tepperman, 1976) refer to new computer related roles being created as a result of rapid computerisation. Tepperman (1976) refers

to an American study by the Bureau of Labor Statistics, in 1966. This showed a marked sexing of roles with only 15 percent of programmer roles, but 93 percent of lower level jobs, held by women. In 1985, 80.2% of all administrative support workers, including secretaries, data entry keyers and typists, were female (Stromberg et al, 1987, p.22). Cockburn (1985, p.7) explains that gender divides in the workplace are common in contemporary societies with women carrying out roles that require little technical knowledge, and men carrying out the roles that require more specialist technical knowledge. However, Cockburn argues '*There is nothing 'natural' about this affinity of men to technology'.*

Cockburn (1985, p.9) equates technology and power within a capitalist society and says that *'Women were actively excluded from technological knowledge, acted upon by the technology and not interactive with it'.* Gansmo, Lagesen and Sørenson (2003, p.38) say that sexual division of work is *'neither a result of women's choices nor of the relationship between home and work'* but *'produced by the way work was organised and divided'* and that *'new technology confirmed such divisions, practically as well as symbolically'.* Gansmo, Lagesen and Sørenson (2003, p.37 citing Nora and Minc, 1980) say there were '*worries that new computer technology would affect women's work in a harmful way, especially in the light of predictions of huge reductions in employment (30-40 per cent) among clerical staff'.* Gansmo, Lagesen and Sørenson (2003, p.37) go on to say that whilst it was recognised there was a potential for the computer to improve the quality of working life for women: *'most new computer systems were designed with a very limited view of the nature of office work and an uncritical acceptance of the existing hierarchal distribution of tasks'.*

The concept of management as separate to business ownership developed during the turn of the 20th Century but different grading structures and promotion prospects for women, together with marriage bars, helped reinforce women as the second class and keep them out of the upper echelons of management (Wajcman, 1998, p.43). Pringle (1989) researched the meaning of the term secretary and concluded that the secretary was defined by her relationship to the male boss, rather than as a worker with skills and competences relevant to their role. Tepperman (1976, p.40) refers to common perception of the role of secretary as *'office wife'* and various *'duties that have no purpose but to make the boss seem, and feel, important' such as the secretary dialling the phone whilst the boss holds the receiver'*. She refers to simultaneous commercial pressure on companies to *'standardize and routinize, to apply uniform systems and procedures for every department'*. Thereby creating a perfect environment for cultivating computerisation, which, says Tepperman, left *'less and less room for initiative even on the part of lower level executives not to mention secretaries'*.

Computers as representative of power and control is explored by Webster (1996, p.57) who refers to a studies by Van Oost (1992) into early cartoons of computers which reveal a fear of the power of the machine, and of human kind being replaced by computers. Van Oost, says Webster, notes that *'the power was paternalistic'*. Webster refers to Shaffner (1993) who identified a link between computers and masculinity, because of the common corporate power theme.

IBM is an example of corporate power and computers. Malik (1975, p.52) says that *'More than most, IBM had been a predominantly male company'*. The attitude of management in the computer industry was fiercely male, as described by Malik (1975, p.159): *'Basically, the attitudes displayed by the management of IBM are not those of men*

engaged in the pursuit of peace, they are those of men engaged in war'. Malik (1975, p.251) quotes the first verse of an IBM song as follows *'Working with the men in the Lab., backing up the men in the field, behind each one in the factory, to a peer we'll never yield!'* Malik (1975, p.191) described the macho culture within the organisation saying: *'The power of the Corporate Office is absolute and almost unfettered by what happens elsewhere within IBM'.* Malik (1975, p.195) says *'IBM is male run almost without exception'.*

Pringle (1989, P.175) cites examples of representations of office technology which she describes as *'construct[ing] gender around relations of domination and subordination... offering bosses an almost superhuman power and control which is equated with masculine virility and power'.* She says that the imagery presents the technology as *'imbued with explicit sexual and phallic dimensions'.* The female, in contrast is without power and dependent: *'Women and technology are both there to serve men as well as to please and titillate them'.* Pringle notes that adverts for office technology are aimed as a male audience (p.177) but even so are overt in their obsession with power and control. Pringle goes on to observe that: *'There is some ambiguity about whether the power is in the machine or the buyer - they are mutually reinforcing'.* She also notes that: *'The computer is represented as an extension of the masculine power but also plays a significant role in constructing it'.* She gives examples of advertisements where, by virtue of positioning, the computer may be interpreted as a phallic extension for an impotent male or phallic substitute for a female. In other images, the computer is a gift from male boss to female staff so that they can operate the machines in service of their superior *'in ways that are, by implication, rather intimate'.* She argues that whilst women operate word-processors, men are in control of computers (p.176).

Pringle points to the representation of new technology as *'marking the end of the special relation between boss and secretary'* which is a highly gendered office relationship and *'an archaic remnant of 'traditional' society'*. The worker is no longer he or she - they are a person with individual traits. Pringle (1989, p.85) refers to an increased focus on *'rationality'* and emergence of *'liberal democratic institutions'* leading to a *'suppression of gender in the main texts'* resulting in *'degendering'*. Tidjens (1999, p.55) concludes *'gender relations in the field of electronic data processing have changed. They are no longer hierarchical and male-dominated to the same extent they once were'*. However, Pringle (1989, p.85) maintains that whilst on the face of it, the modern organisation is rational and de-sexualised, *'family symbolism that structures work as well as personal relationships'* remains embedded and is reinforced by the all pervading imagery of the marketing world and popular culture. In other words, it may not be overt but it is still there, and whilst it may not heavily adulterate our perception of the computer, it may still taint it.

2.4.4 Liberating the workforce

Wajcman (2007, p.287) sees a change in mood amongst feminist writers over the latter part of the 20th century with what she terms '*second wave feminism'* initially *'generat[ing] a fatalism that emphasised the role of technology in reproducing patriarchy'* giving way to a more positive cyberfeminism with technology being seen as *'inherently liberatory for women'*. Wajcman (2007, p.291) notes more positive relationships between women and technology, with technology seen as potentially liberating and empowering and *'post modernist cyberfeminists enthusiastically embrac[ing] web based technologies'*. Wajcman refers to studies by Plant (1998) where *'digital technologies facilitate the blurring of boundaries between humans and machines, and between male and female'*

Wajcman (2006) refers to the emergence of the 'cyberfeminist' and (Wajcman, 2009, p.147) sees this period as a time when researchers are *'positive about the possibilities of information and communication technologies (ICTs) to empower women and transform gender relations'*. There are physical implications, with internet and portable devices providing the opportunity for women to work at home away from the male control structures found in traditional offices (Gutek, 1983, quoted in Huws et al, 1996, p.3). More profoundly, Wajcman (2006, p.11) sees:

> *'...the virtuality of cyberspace and the Internet...as ending the embodied basis for sex difference and facilitating a multiplicity of innovative subjectivities. In the wired world, traditional hierarchies are replaced by horizontal, diffuse, flexible networks that have more affinity with women's values and ways of being than men's'* (Wajcman, 2006, p.11).

Banyard (2010, p.211) concurs saying that the internet *'present[s] opportunities for organising'* and refers to various feminist online communities providing opportunities for developing solidarity and camaraderie and offsetting the potential for isolation and exploitation (Huws, 1994, cited in Stanworth, 2000, p.21).

2.5 THE COMPUTER AS AN INDEPENDENT ENTITY

It could be suggested that the relationship between a computer and user is far more intense than that between a viewer and a symbol. Lœgran (2003, p.219) refers to Turkle (1984) and the suggestion that '*male computer enthusiasts gained an intimacy with the machine as a substitute for intimacy in human relationships'* because it was *'easier'*. Loegran says other researchers, such as Håpnes (1996) conversely suggest that *'the 'hackers' create community around the machines, they are not in their machines'*. Nass and Moon (2000, p.81) point out that the function of the machine will significantly influence the relationship: *'Game players view computers as windows into another world,*

whereas email users treat the computer as a mere conduit, little different than a telephone'. Turkle (1997, p.61) describes early computer enthusiasts as using the computer to process data by interacting with a solitary machine to *'make a world apart'* that was exclusive and separate. Turkle refers to this as a *'second self'* - the *'other'* in a dialogue. Now, computers are connected by the internet and the computer places the user '*in the centre of things and people - in the centre of literature, politics, art, music, communication and the stock market'*. By virtue of the internet, the computer's relevance to the conversation has dissipated. Rather than being a tool to communicate with, it is now merely a tool for communicating through. Turkle (1997, p.60) says:

> *'Today's high school students are more likely to think of computers as fluid simulation surfaces for writing and game playing than as rigid machines to program. Or they are likely to think of computers as gateways to communication'.* (Turkle, 1997, p.60)

Guthrie (1993, p.93) refers to a level of anthropomorphism, where human attributes are ascribed to non-human forms 'without mistaking them for human'. Computers, says Guthrie, are particularly prone to this second level. He refers to the work of Scheibe and Erwin (1979) who assessed students' reaction to computer programs of varying complexities, and discovered a number of students accepted the computers had some volition, and referred to them as he or she. They found that 39 out of 40 participants personified the computer - the more intelligent the program was perceived to be, the more likely a pronoun would be used to describe the computer. Of the 358 pronoun references in this study, *'it'* was most frequently used, then *'he', you'* and *'they'*. *'Fred'* was used once and so was *'that guy'* but interestingly no female pronouns were used. All students were quite clear that they were working with an inanimate object.

Turkle (1997, p.24) points out that at one time, talking to a computer about emotional issues would have been unacceptable, but computer applications have since been made available that provide this support. Turkle (1984, p.33 and p.47) says the computer may be credited with life because of unpredictability and the ability to generate an emotional response in the operator (anger, competition, vindictiveness), thereby creating a social relationship. Turkle (1984, p.61) goes on to say that whilst a computer may not be accredited with emotions, it might be interpreted as having a psychology and therefore the power to think. Marakas, Johnson and Palmer, (2000, p.738) suggest this may be because the computer provides some basic social cues which, despite being minimal, trigger an automatic social response and thereby lead to the acting out of a social protocol by the user. Fogg and Nass (1997) found users reacted as favourably to compliments made by computers as they did to flattery from other humans. Nass, Moon and Carney (1999, p.1103) found subjects would attempt to *'ingratiate themselves to a computer interviewer'*. They concluded (p.1105) that the response was an *'automatic and unconscious'* reaction to social cues and *'mindlessly rely on schemas associated with interpersonal interaction'*.

Marakas, Johnson and Palmer (2000, P.737) say anthropomorphism of machines is something that has been happening since the industrial revolution and not a recent socio-emotional symptom of contemporary society. They propose that the tendency to anthropomorphise the computer is not as a result of naivety, but because nature offers no better match to the complexity of the machine than ourselves. In part, they suggest anthropomorphism may be in order to make the unfamiliar, familiar, and thus easier to understand and less threatening. Another explanation they put forward is that it provides us with another being to blame for societal issues: if we relate to it as an autonomous being, it is as culpable as a colleague, but can more easily be blamed. Moon and Nass

(1998) also found that computers, particularly if they displayed a dissimilar *'personality'* to the user, and where there was a low level of control, would be blamed for errors.

O'Riordan (2006) gives an example of computerised personalities as Ananova, a digital newscaster launched in 2000 which took the form of an animated character that read snippets of news using RealSpeak text to speech programming. The imagery was encoded with feminine traits and symbolically female in terms of representations of hair, clothes, expression, gestures. O'Riordan (2006, p.243) described 'her' as *'the most celebrated virtual persona to date'*. O'Riordan suggests Ananova was part of a commercial trend to personalise the impersonal and notes that the majority of virtual persona emerging from computers were positioned as young, attractive and female. A simple explanation would be that men predominate in programming. O'Riordan (2006) dismisses that as simplistic and says that it is more likely linked to a *'cultural ideology mobilized through two intersecting discourses of masculine / feminine and machinic / natural'* (p.247) and an aim to make computers *'actively friendly, nonthreatening, desirable and malleable'*(p.248). O'Riordan's main criticism is the persona as an unobtainable embodiment of a male fantasy, and is presented as a norm thereby reinforcing sexual hierarchies.

2.6 CONCLUSION

Literature supports the concept of technology as a social product, thereby giving credence to the idea of a computer as a composite of electronic parts, skills and knowledge (Garud and Rappa, 2009, p.346) with a meaning that develops through our observation of others' reaction to it (Webster, 1996, p.26). There is potential therefore for any gender divide within the office, specifically, and society, generally, to be reflected in the meaning attached to the computer (Bowker and Star, 1999, quoted in Lie, 2003a, p.20).

Whilst the computer is a product of society and passive receptor of meaning, it is also an active agent in shaping society. There is an interdependence between technology and society (MacKenzie and Wajcman, 1985, p.4) with society shaping technology, technology shaping society, and technology shaping technology. If through that process of shaping society, the computer reinforces societal gender divides, emphasises divides, and creates further gender divides (Cockburn and Ormrod, 1993 cited in Lagesen, 2003a, p.70), there is potential for the computer to be acquire gender associations as a consequence.

The computer is a product of society, and the meaning attached to a computer is a culmination of design, manufacture, and marketing (Cockburn and Ormrod, 1993, p.20-33). If the institutional actors controlling the technological development are predominantly male (Cockburn, 1985, p.27, citing Rosenberg, 1982, p.35), it would be reasonable to conclude that the meaning attached to the computer is inherently male.

Following the design, manufacture and marketing of an artefact, the meaning attached to it may be further modified, enhanced or reinforced by consumer reaction and usage. The typewriter was considered by Pringle (1989), and it holds particular relevance to this study as a predecessor to the word processor, a computer used by (predominantly female) office workers.

Gender associations relating to the computer (Shaffner, 1993, cited in Webster, 1996, p.57; Corneliussen,2003, p.111) have been identified, but these are specific to a computer's use. For example, gaming is seen as a masculine activity and activities relating to communication are seen as largely female activities (Lie, 2003a, p.25) . The male *'computer geek'* is the embodiment of computer use for gaming and programming (Lie, 2003a, p.25). Whilst this is an enduring archetype, its relevance may be fading as there are

indications the programming industry may now be more readily penetrated by women (Turkle, 1997, p.52) thereby suggesting a potential for feminisation of the *'computer geek'*.

The computer's active agency has been connected to the radicalisation of office workers (Tepperman, 1976 and Pringle, 1989), the deskilling of office workers and also the gendered segregation of staff in the workplace. This active agency could be interpreted merely as mildly influential, or, at its extreme, a purposeful application of patriarchal power and control (Pringle, 1989, P.175) . It has been suggested that this active agency is morphing into a force for female emancipation, primarily through the opportunities for collaboration and solidarity presented by the internet.

Studies support the concept of the computer as a passive recipient of meaning and an active agent of institutional actors: it is plausible that the computer has been engendered as a consequence. Studies have shown that computer usage is engendered and that the gender associations of an activity change over time. There are further studies that suggest the computer may be accredited with independent agency through anthropomorphism, and if a computer is accredited with life and possibly a personality, there is potential for that personality to be engendered.

This presumed anthropomorphism may be as a consequence of the intensity of our relationship with the computer (Lœgran, 2003, p.219), or the computer's reaction to our actions (Turkle, 1984, p.33 and p.47). There are studies (Nass, Moon and Carney, 1999, p.1105) countering the concept of anthropomorphism arguing the reactions demonstrated are automatic in response to simulated social cues. Additionally, it is argued we are now less conscious of the part the computer plays in our communication process with others and therefore the computer has less significance and meaning. There is also, however,

evidence of anthropomorphism of machines over several decades (Marakas, Johnson and Palmer, 2000, P.737).

This chapter has considered the ways in which the computer may acquire meaning beyond its functionality and thereby play a part in actively influencing the gender divide. This may be through its inherent characteristics with prescribed meaning, or through association with an activity, procedure or occurrence in which it is involved or to which it is connected, or as an independent entity, trusted adviser and friend. The intention of this research is to understand how that meaning manifests and in what form for women office workers from different generational cohorts. Whilst life experiences are all unique and subjective, women of similar ages may have had similar exposure and experiences and consequently share a common understanding as to the meaning of the computer in the workplace.

This research asks:

- What is the symbolic meaning of the computer for women office workers?
- Has this symbolic meaning changed over the last 50 years?
- Is there a correlation between the symbolic meaning and age of the participant?

3.0 METHODOLOGY

3.1 INTRODUCTION

This research considers what symbolic value the computer holds for women who have worked predominantly in an office environment. It considers correlation between the symbolic value and the age of the participant, commonalities between generations, and evidence of changing symbolic value over the last five decades.

3.2 ONTOLOGY AND EPISTOMOLOGY

This research is based on the epistemological perspective of interpretivism and focuses on the *'meanings and interpretations, the motives and intentions...that [direct our] behavior'* (Blaikie, 2000, p.115). Flick (2009, p.30) talks about the *'pluralisation of life worlds'* and *'diversity of milieus, subcultures, lifestyles, and ways of living'*. Interpretivism is a research epistemology, say Saunders, Lewis and Thornhill (2007), that appreciates the complexity and variety of the social world. Saunders, Lewis and Thornhill (2007, p.107) say that interpretivism requires the researcher to adopt *'an empathetic stance'* so that the data can be considered from the participant's perspective. However, (Holden and Lynch, no date) it is the researcher's *'view of reality that [provides] the corner stone to all other assumptions'*. The data is going to be interpreted from the researcher's stand point, so it would be appropriate to define this at the outset. My personal ontological assumption, as researcher, is that reality is a participantive experience where symbolic meanings have scientific value. This study therefore seeks to *'explore the participantive meanings motivating the actions of social actors'* and thereby *'understand their motives, actions and intentions'* (Saunders, Lewis and Thornhill, 2007, p.108-9).

This study adopts an exploratory abductive (Blaikie, 2000, p.114) approach, with the objective of identifying the symbolic value held by the participants in relation to the computer. It has a micro-social perspective, in that it looks at the experiences of individuals, thereby acknowledging their individuality, but at the same time it looks for shared meanings through comparison of participants' experiences. It is a cross sectional study in that it considers the participant's response at one point in time, and adopts a qualitative approach to data collection. Pratt (2009, p.856) says qualitative research is an ideal way of gaining '*understanding of the world from the perspective of those studied'*. Miles and Huberman (1994, p.1) describe qualitative data as *'sexy'*. They refer to its ability to contain *'rich descriptions'* which can be used to *'derive fruitful explanations'*. An artefact's symbolic meaning may not be at the forefront of the participant's consciousness. First person verbal reports are a traditional and effective way of exploring the consciousness (Diaz, 2013, p.2). The richness of language and additional layering of meaning through word choice, word sequence and sentence construction, provide a malleable and versatile form of expression allowing ample scope for communicating the many varied and very individual interpretations of reality.

Flick (1998) suggests three theoretical premises to qualitative study: ethnomethodology, which is the study of interactions, a psychoanalysis/structuralist approach, which looks at a subconscious understanding, and symbolic interactionism, which studies the value given by the participants to objects as a consequence of the interactions.

This is a study of the value of objects derived as a consequence of interaction and therefore demands a symbolic interactionist phenomenology. Blumer (1986, p.4) describes the approach as being built on three main premises: i) we react to and interact with a thing

according to the meaning we attach to that thing; ii) such a meaning comes from how we see other people reacting and interacting to that thing; and iii) the meaning attached to each thing is individually interpreted, being a compound of participantively filtered perceptions. Blumer argues that this approach is the opposite of realism, where the meaning of a thing is definite, intrinsic, and constant. In symbolic interaction, the meaning attached to a thing is participantive, and based on the individual's experiences of how they see others behave in the presence of that thing. There, however, has to be a shared meaning, as the meaning would be ascribed following observation of consistent and repeated behaviour by others. A one-off reaction might influence perception, but would not necessarily attribute meaning to a thing.

For Cirlot (1978, p.xxx), the symbol is representation of an idea. Cirlot, (1978, p.xxx, citing Fromm, 1952) defines three types of symbols. The first, *'the conventional'* is described as *'simple acceptance of a constant affinity stripped of an optical or natural basis'*. The second is *'the accidental'* being the result of *'associations made through casual contact'*. The third is *'the universal'* which is where there is *'an intrinsic relation between the symbol and what it represents'*. Cirlot says that symbolism is based on the understanding that (1978, p.xxxvi) *'nothing is meaningless'* and that symbols have real and symbolic components, e.g. water as a symbol of purity'. Symbols, says Cirlot, can be interpreted on several levels and a strong symbol will be consistently interpreted throughout these levels.

Danesi (2009, p.ix) talks of two types of symbols, those that are *'shorthand for concrete ideas'* and those that are *'mythic'* saying that *'symbolism is the key to understanding the underlying structure of social systems'*. He refers to the work of Cassirer who credited symbols as providing the foundation for our understanding of the

world, enabling us to encapsulate experiences through the *'solidification of impressions'*. Cassirer (1953, p.38) says that *'it is only by symbols that distinctions are not merely made but fixed in consciousness'*. For example, a computer and all that it entails is compressed into the word *'PC'* and a pictorial symbols such as 💻.

Artefacts themselves can hold symbolic meaning far beyond their immediate form and function. Symbols communicate culture and Lie (2003b, p.253) points out that *'artefacts are not only descriptive or reflective of culture. They are, according to Geertz (1973) also vehicles of meaning, or that which stimulates thinking'*.

For Blumer, symbolic interaction is more than psychical accretion. It is not just about reactions that stem from repeated associations. It is a more complex process where, because we are keen to fit in (Forte, 2008, p.173), we look to be guided '*by the symbol systems and interpretive processes central to [our] salient memberships and learned through social experiences'*. Forte (2008, p.173) says that the majority of our actions in a social situation are symbolic in that we act in accordance with the *'meanings assigned to the objects composing our worlds'*. Society is full of objects and it is the objects that help us understand what is expected in relation to certain actions. *'Objects'* could be physical, an indication of a role, or an abstract object such as philosophy. Our interactions with these objects not only help us understand what we need to do to fit in, but through these interactions, we gain an understanding and definition of ourselves (Blumer, 1986, p.12).

Blumer (1986, p.6) talks of *'human groups or societies'* as organised structures based on relative activities between its members. This *'social interaction'* is not so much the reaction of one actor to the conduct of another (Blumer, 1986, p.8 terms the non-interpreted reaction as *'non-symbolic interaction'*) but action being taken in anticipation of action by others, i.e. proactive rather than reactive, with the intention of stimulating a

reaction in the other. Saunders, Lewis and Thornhill (2007, p.107) summarise this *'intellectual tradition'* as a *'continual process'* where we *'interpret the actions of others'* and adjust *'our own meanings and actions'* in response. The concept is principally that meaning attached to an object by a participant is determined by their experiences of that object, and what a participant thinks about an object is revealed by how they act towards that object.

Actor Network Theory (Law and Lodge, 1984) refers to a conceptual framework with a principle of generalised symmetry where equal amounts of agency are assigned to all actors. In symbolic interactionism, Blumer (1986) ascribes no agency to objects and considers them passive receptors of the meaning attached to them by the participant.

Symbolic interaction has parallels with a feminist constructivist view of technology. Akrich (1992) suggests that *'innovators 'inscribe' a specific vision about the world into the technical content of the new object'* and this script impacts on people's reactions to it and relationships that are formed around it. Akrich (1992) says *'like a film script, technical objects define a framework of action together with the actors and the space in which they are supposed to act'.*

Flick (1998, p.18) says that the key to successful research from the perspective of symbolic interaction is to reconstruct the world as the participant sees it. Flick (1998, p.19) recommends a semi standardised interview technique and a process that focuses the participant on the interaction rather than the meaning itself. Alvesson (2003, p.14) warns against assuming that the interview is purely a sophisticated tool for acquiring knowledge of the subject's experiences. For Alvesson the interview itself is *'a socially and complex linguistic situation'*. In addition, Bamberg (2006, p.142) suggests that *'to view experience, action, lives, and persons as texts that can be read in the very same way as we read*

narrative texts, may constitute a serious reduction'. De Fina (2009, p.237) points out that interviews, rather than being *'artificial social encounters'* are actually *'interactional events'* and as long as *'interactional rules and social relationships'* are respected they can produce valuable data. Alvesson (2003, p.21) argues that words are used, not for *'mirroring reality',* but for making sense of it and the participant will be gaining an understanding through the interview process.

Narrative study is an interview technique used to collect data in the form of a story from a participant. The level of prompting providing by the researcher varies, but may be as much as that found in semi-structured interviewing. A narrative interview method has been used in this study as the prime method of data collection.

3.3 ROLE DEFINITION

Blaikie (2000, p.115) warns that an interpretivist approach requires a focus on how the participant, and not the researcher, sees and experiences the world (Blaikie, 2000, p.115). Whilst the role of 'detached *observer'* or *'uninvolved spectator'* (Blaikie, 2000) may be possible by the researcher at some stage of the process, the researcher will inevitably filter the data through their own understanding and experiences (Holden and Lynch, no date). In addition, Vähäsantanen and Saarinen (2012) talk about a power dance intrinsic to the interview, with both interviewee and interviewer being 'participants' in the process reciprocally controlling the situation, and influencing the other person's actions and conversation' (2012, p.494). In this study, participants' involvement was entirely of their own volition and they were given opportunity to talk about what they wanted to unprompted once the generative narrative question had been outlined (Jacobsson and Akerstrom, 2012, p.729). Huddy et al (1997, p.197) say a female interviewer will generate a more feminist aligned response in questions relating to female issues. I accepted that my

gender might therefore encourage gender conscious responses from participants. I made attempts to suspend a prior understanding of the research subject (Flick, 1998, p.41) during the interviews, but this proved difficult. Maxwell says that it is impossible to eliminate the *'researcher's theories, beliefs, and perceptual lens'* and better simply to understand how they may impact and look not for *'indifference'* but *'integrity'* (2013, p.124). Weiss (1994, p.110 as quoted in Maxwell, 2013 p.91) stresses the importance of recognising that the researcher is *'a partner in the production of useful material'*. I therefore elected to identify at the outset my own personal view of the computer as a masculine tool of dominance and critically review my decision-making on an ongoing basis for researcher bias.

Saunders, Lewis and Thornhill (2007, p.116) stress the need for empathy on the part of the researcher whilst Maxwell (2013, p.92) warns researchers against assuming that their understanding of events is the same as the participants. Maxwell (2013, p.93) goes on to suggest that the researcher efforts to, not only be self aware, but also understand what the participant thinks of the researcher and the research *'in order to develop a useful and ethically appropriate relationship with them'*. Winkler (2003, p.395) stresses a need to be on the guard for *'self-deception, unaware projection and consensus collusion',* stressing the importance of the researcher fully anticipating their impact on what is a cooperative research relationship during the researcher/participant relationship. Efforts were made during the interviews to be an attentive listener and to be disciplined in my empathetic relationship with participants.

With reference to Blaikie's (2000, p.52) typology, my involvement in the interview process fluctuated. It was at times *'mediator of languages'* filtering the participant's input through their own values and learning. At other times, it strayed into the realm of

'reflective partner' and at other times I took a more co-productive stance reducing my authorial control to that of *'dialogical facilitator'*.

3.4 RESEARCH QUESTION

This research asks:

- What is the symbolic meaning of the computer for women office workers?
- Has this symbolic meaning changed over the last 50 years?
- Is there a correlation between the symbolic meaning and age of the participant?

3.5 SAMPLE STRUCTURE

Snowball sampling fitted the study because it is slightly 'randomised' thereby reducing the researcher's control and alleviating to some extent the potential for bias. Recruitment for this study was intended to initially be through purposeful selection (Maxwell, 2013, p.93) of three participants (Newman, 2010) and thereafter through 'snowballing' (Saunders, Lewis and Thornhill, 2007, p.232). If the sample became disproportionately representative of one age group over others, or the snowballing stopped, the intention was to make further limited purposeful selection through my social and professional networks. An interpretivism epistemological stance at the outset reduced the potential for generalisabilty (Saunders, Lewis and Thornhill, 2007). However, the intention of the study was to understand *'typical meanings produced by typical social actors'* (Blaikie, 2000, p.115). Participants were asked to refer people they knew who met the prerequisites to the study and it was anticipated they would introduce like people, thereby improving the potential for common threads and commonalities between participants.

The research question required that the sample be representative of fifty years of working population with a view to identifying commonalities amongst participants of similar ages. A generational divide was introduced as this took into account typical characteristics linked to socio-political events (Kovary and Buahene, 2005, p.R6):

- Baby Boomers: 1946 - 1964
- Generation X: 1965 - 1982
- Millennials (aka Generation Y): 1983 - 2000

Following consideration of available time and resources, a sample capacity of 30 hours of interview data was targeted. Flick 1996 (as cited by Flick, 1998, p.63) says that the impact of technological change on subjects varies by profession and gender and that there are also cultural and political dimensions. Resource availability was insufficient for this study to consider a sample that was cross politically and culturally representative.

This study considers how women see the computer within the culture of an office. Baldry (1997, p.365) says the term office can *'both describe a particular sort of building and refer to a specific form of work organisation*'. He suggests that it has *'become a metaphor for all non-manual, mental, indirect work'*. Participants self-qualified according to their understanding of the term *office*. Similarly the term *woman* was left to the participant to interpret noting *'If somebody is interviewed as a 'woman,' a 'leader,' and a 'middle-level manager,' different identities are invoked'* (Alvesson, 2003, p.20).

In summary, women aged 18 or over who had worked predominantly in an office environment during their professional career were invited to participate in the study.

3.6 METHOD

Bauer and Gaskell (2010, p59) describe narrative interviewing as an in-depth unstructured interview and Flick (1998, p.101) says that narrative will produce data that is

specifically different to the semi structured interview in that it will have a *'certain independence'* with a richer level of data. Saunders, Lewis and Thornhill (2007, p.504, citing Coffey and Atkinsons, 1996) summarise narrative study as seeking *'an account of an experience that is told in a sequenced way, indicating a flow of related events that, taken together, are significant for the narrator and which convey meaning to the researcher'*. Narrative is about telling a story. The story is at best a related memory. Narrative research draws on the memory and associations between events of the informant. In simple terms, it requires a participant to piece together recollections, with significance being attached to the words used, the way in which the story is told and the order of the events related in that story. Connelly and Clandinin (1990, p.2) suggest *'humans are storytelling organisms who, individually and socially, lead storied lives'*. Allan, Fairtlough and Heinzen (2002, p.231 citing Bruner, 1990, p.56) concur saying that *'narrative form is intrinsic to human thinking'* and *'our minds are hard-wired to organise experience as narratives'*. Flick (1998, p.105) says that narrative research provides a mechanism for researching a person's life story in context. Moen (2006, p.60) defines this context as their *'social, institutional and cultural setting'*. By asking the participant to *'tell a story'* they are given the opportunity for expression of their interpretation and understanding rather than their literal observation. Narrative research will produce a story of a person's life, as they recall it. There is a danger (Flick, 1998, p.105) of relying on the data as factual data. The participant's understanding is further developed through the act of telling the story because narrative is *'the primary scheme through which human existence is rendered meaningful'* (Polkinghorne, 1988, p.1, quoted in Moen2006, p.60). As Bamberg (2006, p.145) explained, narrative research will not give access to a person's life experience, nor their self-reflections of those experiences, but to words. Allan, Fairtlough and Heinzen (2002,

p.206) go further and describe the art of story telling not as a literal tradition, but of an oral tradition where sounds are made - sounds are ephemeral, and will change each time the story is told. The data collated is therefore relevant only at a point in time.

Asking participants to relate their understanding of an experience requires them to *'tap into...'episodic memory', an important and distinct neurocognitive memory system'* (Maxwell, 2013, p.103 citing Dere et al 2008 and Tulving 2002). Asking a participant to recall actual experiences is more effective than asking them to provide a generalised account, as the latter generates broad generic information as opposed to a detailed and in-depth description of the impact (Weiss 1994 cited in Maxwell 2013, p.103). Bauer and Gaskell (2000) say that every story contains the following components:

- detail in order to add credibility;
- the aspects that the story teller considers relevant; and
- a start, middle and end.

The emphasis in narrative research is to produce a story. The level of interaction between participant and researcher is predefined, but could be as limited as the researcher merely providing a prompt for the participant to lead off from. Bauer and Gaskell (2000, p.63) define a 4 phase approach with initiation, main narration, questioning phase and concluding talk, involving varying levels of interaction between the researcher and participant throughout. Flick (1998, p.99) suggests a generative narrative question followed by (citing Riemann and Schütze, 1987, p.353) *'narrative enquiries in which narrative fragments which were not exhaustively detailed before are completed'* and (Hermanns, 1995, p.184 quoted in Flick, 1998) a final *'balancing phase'* in which questions are asked of the interviewee aimed at *'reducing the meaning of the whole to a common denominator'*.

This study adopted:

1) Initiation phase - invitation to take part (appendix A)
2) Interview:
    a) Generative narrative question
    b) Questioning phase
3) Sharing of transcription and initial thoughts
4) Further dialogue via email constituting the balancing phase.

The narrative data was collected, interpreted, compared with other data, shared with the participant and then further data was collected by way of a subsequent email dialogue with a view to formulating an understanding (Flick, 1998, p.450). Data was collected during narrative interviews by way of a digital recorder.

In the findings, pseudonyms have been adopted for participants as follows: Baby Boomers denoted by names with 'B' as the initial letter, Generation X's with the letter 'G' and Millennials with the letter 'M'.

3.7 OVERVIEW

The intention was to interview sufficient participants face to face to collate 30 hours of material. The cohort was to be divided by generation, with participants recruited as part of a snowball selection process following direct approach to an initial purposefully selected sample.

The narrative interviews were shorter than anticipated and recruitment more challenging than envisaged. Although 2 interviews extended beyond an hour (a Baby Boomer and a Generation X), the average duration for Baby Boomers, Generation X and Millennials were respectively 35, 31 and 20 minutes, with one Generation X interview lasting only 10 minutes. A total of 37 participants were interviewed. Whilst this produced

only 17.4 hours of data, it was detail rich data. 248 minutes (24%) of data was provided by way of 7 Baby Boomers, 16 Generation X participants provided a total of 503 minutes of data (48%) and 14 Millennials contributed 291 minutes (28%) of data.

	Baby Boomer	**Generation X**	**Millennial**	**Total**
Minimum Duration (Mins.)	21.27	12.85	10.47	10.47
Maximum Duration (Mins)	63.62	62.20	32.32	63.62
Median Duration (Mins)	26.60	29.83	20.37	27.88
Average Duration (Mins)	35.57	31.44	20.84	28.21
Number of Participants	7	16	14	37
Total Duration (Mins)	248.98	503.12	291.77	1,043.87
Total Duration (Hours)	4.15	8.39	4.86	17.40
%	24%	48%	28%	100%

Figure A - Analysis of volume of narrative data

10 participants agreed to be involved following a direct approach. 2 participants were engaged as a result of referrals. The remainder (25) were recruited by way of messages on LinkedIn offering a box of chocolates to women who had worked half of their working lives in an office in exchange for their time on the telephone.

	Connected Via			
Generation	**Direct Approach**	**LinkedIn**	**Referral**	**Grand Total**
Baby Boomer	3	3	1	7
Generation X	4	12		16
Millennial	3	10	1	14
Grand Total	10	25	2	37

Figure B - Analysis of source of participant

The LinkedIn post was visible only to my connections which comprised mainly human resources and recruitment professionals.

	Industry			
Generation	**HR**	**Other**	**Recruitment**	**Grand Total**
Baby Boomer	2	3	2	7
Generation X	10	2	4	16
Millennial	4	5	5	14
Grand Total	16	10	11	37

Figure C - Analysis of industry of participants

All but 5 of the participants were interviewed over the phone, 25 were active users of the professional social media site LinkedIn. 2 participants refused the offer of the chocolates, 1 potential participant, it emerged at the end of the process, did not fit the criteria (their data has not been processed) and was clearly incentivised by the offer of the chocolates. 2 participants had prepared notes prior to our conversation and 1 participant had written a script and read through it verbatim.

	DURATION OF INTERVIEW (MINS SECS)							
Pseudonym	**Baby-Boomer**		**GenerationX**		**Millennial**		**Connected via**	**Industry**
Belinda	21	16					Direct Approach	Other
Bonnie	25	22					Direct Approach	Other
Bianca	25	32					Direct Approach	HR
Brittany	26	36					LinkedIn	Recruitment
Beatrice	41	32					Referral	Other
Betty	45	4					LinkedIn	Recruitment
Barbara	63	37					LinkedIn	HR
Gail			12	51			Direct Approach	HR
Gabby			18	38			LinkedIn	Recruitment
Georgia			27	53			LinkedIn	Recruitment
Geraldine			27	5			Direct Approach	HR
Gertrude			28	15			LinkedIn	HR
Gigi			29	53			LinkedIn	HR
Giselle			29	0			LinkedIn	Recruitment
Gladys			29	16			LinkedIn	Other
Glennis			30	15			Direct Approach	HR
Gloria			32	32			LinkedIn	HR
Gilly			29	47			LinkedIn	HR
Grace			35	9			LinkedIn	HR
Greta			36	5			Direct Approach	HR
Gwenda			36	52			LinkedIn	Recruitment
Gwyneth			37	24			LinkedIn	HR
Griselda			62	12			LinkedIn	Other
Mabel					10	28	LinkedIn	Recruitment
Myra					13	58	LinkedIn	Recruitment
Macy					14	22	LinkedIn	Other
Madeline					15	55	LinkedIn	Recruitment
Madonna					16	7	Direct Approach	Other
Mary					17	42	LinkedIn	Recruitment
Meg					19	15	LinkedIn	Other
Marie					21	29	LinkedIn	Other
Mallory					22	1	LinkedIn	Recruitment
Myrtle					22	53	LinkedIn	HR
Marcie					24	2	LinkedIn	HR
Martha					30	48	Direct Approach	HR
Mildred					30	27	Direct Approach	HR
Maud					32	19	Referral	Other

Figure D - Detail of participants

Baby Boomers generally talked for longer periods before generative questions were required. This was possibly because they have lengthier career histories to talk through. Other participants struggled with the concept of the narrative research and the period between generative narrative question and questioning phase was comparatively short, particularly Millennials.

3.8 ANALYSIS

Analysis of the data was primarily through *'an inductive process of organising data into categories and identifying patterns (relationships) amongst categories'* (McMillan and Schumacher, 1993, p.473).

Analysis began with transcription of the recordings during which ideas were formed on how the data could be categorised and compared (Maxwell, 2013, p.104). Notes were written and memos made whilst reading through the narrative as this was useful in not only capturing ideas, but also in promoting thinking and stimulating further ideas (Maxwell, 2013, p.105 and Punch, 2005, p.201). The transcript together with my initial thoughts and requests for further information were sent to the participant who was invited to respond with additional data. This additional information was then reviewed with further notes and memos made. All data was then sifted and sorted

As well as contrasting, comparing and linking themes within a text, I contrasted, compared and linked themes between participants. As per Smith (1979, cited in Maxwell, 2013, p.106) I looked for antecedents and consequences, grouping things that were similar, identifying differences and hoping *'these similarities, and differences [would] come to represent clusters of concepts which then organise[d] themselves into more abstract categories and eventually into hierarchal taxonomies'*. I reviewed, and challenged my initial interpretations and looked for *'multiple interpretations'* (Alvesson, 2003, p.22).

A formal analytical process followed in which data was coded, by identifying sections with relevance to the topic (Seidman, 1998, p.100 cited in Maxwell, 2013, p.107). I made notes in the margins, circling and connecting sections with lines on the printed transcripts and emails. Use of metaphors, reference to genres and any cultural scripts (Alvesson, 2003, p21) were also highlighted. Metaphors were considered to be particularly useful in understanding the participant's thought process (Chambers, 2003, p.406).

This revealed concepts (Maxwell 2013, p.108) which were built into a matrix with the fragments categorised into subcategories. Initially, there was a process of open coding, as I looked for themes and concepts (Flick, 2014; Maxwell, 2013; and Punch, 2005). Flick suggests a line by line analysis of text whilst continuously asking a series of questions. I asked myself the following questions (based on those put forward by Flick, 2014, p.407) repeatedly whilst going through this process:

- What is it about?
- Who is involved, what are they doing and how do they interact?
- What is happening, how long is it taking, when and where is it taking place?
- What is the level of intensity?
- What reasons are being given?
- What's the purpose?

I adopted a *'flip-flop'* technique (Flick, 2014, p.407) asking the questions in relation to sections of the text, and also the whole narrative. The resulting list of *'codes and categories'* (Flick, 2014, p.373) was then used to create labels. A process of axial coding then took place with the intention of connecting the first level abstractions into theoretical

categories. A subsequent analysis was carried out with the intention of identifying a proposition (Punch, 2005, p205-211, Flick 2014, p.409) within the theoretical categories.

Saunders, Lewis and Thornhill (2007, p.504) and Punch (2005, p.217) suggest that the fragmentation of data may distort the meaning, and that narrative data is best analysed in context. A more holistic analysis of the data therefore followed. I summarised the narratives and then considered the chronological sequence of events narrated by the participants. Development of the codes was an organic process. Miles and Huberman (1994, p.57-63) suggest summarised notations and abbreviations that maintain a relational structure, and I developed a shorthand whilst carrying out the coding.

3.9 VALIDITY

The epistemological and ontological approach recognises a richness of interpretation of reality and accepts that the results will not be generalisable. Therefore, external validity is not relevant. Pratt (2009, p.857) warns against *'making qualitative research seem quantitative'* and trying to draw up some statistical rationale, saying that the sample will not be large enough, and *'it would be too anemic a representation to adequately represent rich data'*.

The effectiveness of narrative study in collating reliable data is dependent on the participants being genuine in their accounts. A hidden agenda by the participant might corrupt the data and there is a great deal of trust placed in the participant being genuine in their response (Jacobsson and Akerstrom, 2012, p.729). Schegloff (1997 cited in De Fina, 2009, p.235) says that '*people tell stories to do something: to complain, to explain, to boast, to alert, etc'*. Alvesson (2003, p.14) warns about any preconception that the participant will be a *'competent and moral truth teller'*. There is little that could safeguard against an unaligned participant's agenda (Jacobsson and Akerstrom, 2012, p.729).

Validity requires accurate analysis of the data, with the researcher extracting from the data the same meaning ascribed to the data by the participant and in turn effectively communicating this meaning to the eventual audience. Unfortunately, the scope for interpretation of text provides significant margin for error in the communication process. (Flick, 1998. p.30). Miles and Huberman (1994, p.1) acknowledge concerns over the process of qualitative data analysis, which they accept is approached by some *'intuitively'* as *'an art form'* and urge *'dependable, credible and replicable'* methods of analysis.

In order to maximise face validity (Leedy 1997, p.33), participants were pre-warned about the use of narrative technique during the initiation phase, and informed of the focus of the research prior to the interview. This increased the probability that they would talk about their experience with computers during the interview. Whilst efforts were made not to interrupt the participant, if they strayed significantly off topic, they were guided back through the use of computer related questions.

The act of recording the conversation might have stifled the participant, or encourage artificiality. However, the use of a digital recording along with researcher notes provided 'rich data' which (Maxwell, 2013, p.126) helped improve the validity of the results.

Flick (1998, p.103) warns of the *'systematic violation of the role expectations of both participants'* if the narrative requirement is not fully understood or as expected. This risk was negated by way of the initiation phase. Flick warns that some subjects may find it difficult to tell their life stories because there is not a lot of opportunity in everyday life to do this. They might be shy and reserved, or come from cultures where sharing such expansive details of their life with a stranger might be difficult for them. Interventions at the balancing stage and final questions helped generate additional data to supplement the

narrative whilst I used encouraging gestures / sounds to demonstrate a definite interest in what was being said to encourage open and comprehensive input during the narrative stage.

Participants' recollections change over time, and the feelings, thoughts and actions relevant to a particular experience may not be accurately recalled. Whilst this might reduce the content validity, the study is an attempt to understand a contemporaneous relationship with a computer by a person over several decades and accepts that the data collated is the participants' current understanding of their life experiences. Bruner (1986, p.11, quoted in Philips, 1994, p. 16) says that narrative research is about 'verisimilitude' and need only be 'believable' - not necessarily true.

Flick (1998, p.99) says the initiating question prompting the narrative needs to be sufficiently broad so as not to excessively restrict the participant's focus. It also needs to be sufficiently narrow to ensure that the data collected is relevant. These risks were considered when formulating the initiating question. The study relates to work, so there was an increased potential for the participant to lapse into *'moral storytelling'* (Alvesson, 2003, p.21) as they feel obliged to convey a positive impression of themselves and the organisation they work/worked for. I adopted careful *'impression management'* and looked to establish a rapport and trust at the earliest opportunity (Alvesson, 2003, p.21)

Flick (1998, p.77) suggests unstructured questions, moving to more focused questions, with care being taken by the researcher as to when and which questions are used on order to avoid curtailing the response of the participant. This pattern was adopted during the questioning phase. Flick (1998, p.79) recommends *'retrospective inspection'* for improved specificity and, in order to secure sufficient depth to the data, Flick recommends referring the participant to feelings. These techniques were enlisted at the balancing phase.

When interviewing participants with whom I had a pre-existing relationship, I endeavoured to adopt the position of an outsider. If I had no prior knowledge of the participant, I worked to break down barriers in order to ensure openness and frankness, and to gain the participant's confidence in the process.

Maxwell (2013 p.124) identified reactivity by the participant to the researcher as a significant threat to validity in an interview scenario because the interviewer becomes *'part of the world he or she studies'* and is a *'powerful and inescapable influence'* on what the participant says. Maxwell says it is not possible to negate this influence and it is more a case of understanding what the influence is. As Flick (1998, p.55) maintains, the researcher cannot be a neutral tool in the process and suggests that the role they assume is as a result of negotiation between themselves and the participant. However, in order to ensure validity, this needs to be a relationship that is consistent to all interviews. The difficulty of removing researcher bias from the process has been discussed above, and in order to secure *'internal validity'* I approached the research not with indifference, but with integrity (Maxwell, 2013, p.124).

The method used for analysis of the data was critical to the validity of the research. Winkler (2003, p.394) talks about the researcher taking an active part in the process as *'an informant with a view'* who does not *'remain silent when there is a chance to speak'*. Winkler is referring to the transcribing process when sections of text ('padding') are included alongside dialogue to *'create an illusion of coherence and control over the enquiry'*. This can impact on the validity of the study, as the researcher cuts and pastes, juxtaposes and edits snippets of narrative to support what they believe to be their findings. A participative approach to the analysis between researcher and participant helped reduce the potential for this.

The participants were given opportunity to confirm or challenge the initial deductions and I looked for text that disproved as well as confirmed the assumptions during the analysis, in an effort to improve validation (Maxwell, 2013, p.126)

Reliability of the results was maximised by ensuring as far as possible consistent experiences by the participants in relation to the research. For example, the participant was interviewed at their preferred location, at a time convenient to themselves. They were taken through a standardised initiation phase, the interview progressed consistently and in line with pre defined rules, and the data was analysed consistently. There is a relatively high level of control and opportunity for tactical planning in the research process, thereby demonstrating Leedy's (1997) quality criteria of 'universality' and *'repeatability'*. The interview *'formula'* can be easily reproduced and the text analysis is in line with a predetermined framework.

3.10 ETHICAL CONSIDERATIONS

Expressed consent was obtained by way of the participant's signature on the information sheet (see Appendix A), a copy of which was given to the participant for future reference, and a copy retained by the researcher. Use of information, right to opt out, and ownership of data are all explained in this sheet.

It could be argued that informed consent requires a full statement of purpose. There was a need to avoid being excessively directive (Josselson, 2007). The result is a statement of purpose that is, arguably, not totally accurate as it is a partial truth. This is not deception as there is no attempt made to misdirect the participant, merely to limit their understanding of the focus of the research and it is therefore justified. To do otherwise would invalidate the results by positioning the participant at the outset. The actual research questions were shared openly at the balancing phase.

Participants were offered a copy of the initial analysis of their narrative, and any subsequent analysis of their input, and encouraged to enter into a dialogue. Access to the final thesis was also offered. At the outset, participants were advised should they decide not to continue with the study, that they could stop the process at any time, and this option was detailed on the information sheet. In the event that a participant withdrew, any data given up to the point of withdrawal was to be destroyed. No participants withdrew.

The data provided by participants is being stored confidentially. It is not, however, possible to guarantee the participant's anonymity as the data collated is individual and likely unique in many ways. Efforts are being made, where practically possible, to obscure their identity in this and any publications that may stem from this study. The data is stored on my personal laptop and backed up on a series of memory sticks, all stored securely at my home. The laptop does not at any time form part of a computer network, and is protected by MacAfee which means that it cannot be accessed through the internet without authorisation.

4.0 FINDINGS

4.1 INTRODUCTION

The purpose of this study was to consider the symbolic meaning for women of the computer in the office. The preceding three chapters have served as an introduction to the potential for the computer to have symbolic meaning. This chapter presents the findings, with efforts being made to balance *'telling about the data'* and *'showing it'* (Pratt, 2009, p.857).

In the following, pseudonyms have been given to each of the participants to preserve anonymity.

A narrative study was conducted, data collated and analysed. Participants talked about computers and activities associated with computers. They talked on occasions in direct terms about the significance computers held for them. However, they mainly talked about events associated with computers and about the impact of computers on their lives. Some of the symbolic meanings below were identified when directly referenced by participants. Some of the symbolic meanings were identified when participants implied or alluded to them. The majority of symbolic meanings below, however, have been identified by filtering the data through my own understanding and experiences (Holden and Lynch, no date).

The findings are discussed against the framework of the themes introduced in the literature review. Each section includes a basic cross analysis of the data relating to the three generational cohorts in an attempt to understand how that meaning has changed over the last 50 years and if that meaning was relevant to one generation or shared with other

cohorts. Each section concludes with a short summary in the form of a table showing how the findings answer the research questions, which are as follows:

- What is the symbolic meaning of the computer for women office workers?
- Has this symbolic meaning changed over the last 50 years?
- Is there a correlation between the symbolic meaning and age of the participant?

4.2 THE COMPUTER AS MORE THAN JUST AN ARTEFACT

4.2.1 The computer as a social product

Lie (2003a, p.21), Garud and Rappa (2009), Bijker, Hughes and Pinch (1987) and Webster (1996, p.26) consider technology to be a social construct, made up of physical form, human activities and knowhow. This study looked for evidence of knowledge or practice (Lie 2003b, p254) associated with the computer that would indicate that the computer held meaning beyond its primary form and function.

Participants talked about their introduction to the computer, existing skills and knowledge essential for their interaction with the computer, skills that developed as a consequence of their interface with the computer, and skill deficits that led to their marginalisation or exclusion from computerised activities. The skill most commonly named was the ability to type, as this was considered essential to interaction with a computer through the keyboard. How each participant talked about the skill gave insight into the meaning attached to the skill and, therefore, the meaning attached to an artefact requiring use of that skill.

Amongst Baby Boomer narratives, there was reference to formal secretarial training. Barbara did a secretarial course for 2 years and was *'a professional*

PA/Secretary'. She can type *'properly*' and has a high level of grammar. She learnt to type on a manual typewriter, then moved to an electronic typewriter, and very soon thereafter to a word processor. There was no formal computer training and the computer was, for Barbara, an evolution of the typewriter. Her skills in interacting with the computer have evolved in line with the computer. Whilst the ability to type was fundamental to her professional role as a secretary, she *'left that industry when things changed and people started using [word processors] more and more'*. She says *'if you are using technology all the time you get used to it*'. She hesitated in developing her computer skills at one time, but says *'I had not envisioned that I would be using technology the way I am using it now and doing what I am doing and learning what I am learning'*. She recently built a website. It took her three weeks and she says *'I did have to get somebody to come and massage my back'* afterwards because she had been sitting down so much. The computer is important for her business. She is self employed. However, it is not the focus of her work, merely a utensil in delivery of the service. She drives the business forward and the computer is just another tool.

Belinda first learnt to type when she was presented with a keyboard and PC. She associated typing with the secretarial training of bygone years. She had heard about children at school having had typing lessons at one stage. She says she was *'not in that age bracket'* suggesting she was a member of a more modern, emancipated generation. She considered herself to be more than a secretary and it was in her role as manager that she first needed to learn to type.

Brittany started her first business in an office within a business centre. She would go to reception and *'the girls would type [her] letters for her'*. When Brittany was at school *'there wasn't a computer in sight'* and *'the nearest thing to a computer was the*

language laboratory'. She was quick to add that she went to *'a very traditional girls' grammar school'* and they did not learn to type there, as though typing was a skill more relevant to a progressive comprehensive education. She has since taught herself to type and can type, she says, '*very quickly'*. For Brittany, secretaries typed. She was not a secretary, but as her career developed, her inability to type became a barrier, which she overcame through a concerted effort.

Of relevance to this section is an account by Beatrice who says her students were given the option of learning to type or learning to use the computer. She says the computer classes, which she delivered, were oversubscribed, but typewriting was still very popular as there were a lot of parents who did not see the future potential of the computer and preferred their children to learn a practical skill on a typewriter. The typing classes were mixed gender.

Bonnie says it was *'quite painful'* watching male colleagues at work *'searching out where the next letter was'* when trying to use a computer. She says she recognised, as a female, an expectation that she would learn to touch type, and although she did not have formal lessons in typing, her mother was a journalist who taught her daughter to touch type on a Petite toy typewriter. Typing, for Bonnie, started as a game, and it was not until she was studying for her 'O' levels that the skill was used with computers.

Similar to Bonnie, Gladys remembers learning typewriting skills through play as a child. It was on her Grandma's typewriter. She later played on her sister's computer instead of handwriting things for school.

Gloria also played on a typewriter as a child, and then learnt to touch type formally at school on an *'old fashioned typewriter'* where only girls were allowed to learn to type so

that they could find work as secretaries. Typing and secretarial skills are therefore synonymous for Gloria.

Geraldine was also taught formally to type. Her Information System's lecturer, she says, *'literally sat the class down'*, taught her how to speed type and said *'if nothing, it will set you up for life whatever career you go into'*. Her degree was in Accountancy, so typing skills were not obviously relevant at that stage. However, she is thankful for her lecturer's foresight as the skill has proved of value to her in her career development.

Similar to Belinda and Brittany, Greta associated typing with a lowly female dominated profession. She wanted to be an artist, but her father wanted her to be either a nurse or work in an office. She says *'just to satisfy my dad's need for me to become a secretary or nurse I decided to go to college to learn how to type, touch type, and also did shorthand'*. He bought her an electronic typewriter to encourage her in her professional development but she says that because she is so *'bloody minded'* she passed all her exams except typing. She says she *'couldn't stand the thought of being a typist in a typing pool'*. She now types well and finds the skill useful in her administrative role.

Gwyneth, as with Barbara, saw the computer as an evolution of the typewriter. She says that she used to have an old typewriter, and then went onto an electronic typewriter, '*which was very old'*, before she moved over to a PC. At the time, she says, in Europe only secretaries typed with 10 fingers. She was on a study exchange in the USA and says:

> *'In the US, I was so surprised because everybody in the high schools was forced to learn to type with two hands and I wasn't allowed to leave the class until I actually could type with 10 fingers. So...that's how my story started with computers'.*

In the accounts of Millennials, typing skills were acquired incidental to other activities. Macy said she learnt to type at primary school. The computer had always being used by her parents and other siblings, so she found it natural to use. Madeline is not sure

when she learnt to type and thinks it may be since she has started work. Myrtle says that she realised she could type well when she was 11 or 12 and using a computer. She says *'All of a sudden, just because it was the thing that everyone was using. I felt I had to learn because everyone was using it'*. Because of where Myrtle lived, the computer was the main medium for communicating with friends at High School. She quickly learnt to type through chatting online. Mildred and Margaret also learnt to touch type through chatting on line. Myra was taught to type in IT lessons. Mary said her mum had done a course and learnt to type quickly on *'typing machines'*. Typing is just part of using a computer and came naturally to Mary. Martha says she is impressed with how fast she can type, and thinks this is because she types a lot. Mallory says she cannot remember when she learnt to type, she just knows it was from a young age. She says she is really confident with computers *'and can type really fast'*. Macy says there was always a computer in use in her home and she thinks she *'just kind of got the hang of it'*.

In summary, there was an air of disdain for typing from Baby Boomers who saw the skill akin to the lowly occupation of secretary. Baby Boomers association of typing with the subordinate secretarial role, a historically relevant and enduring archetype, suggests symbolic connotations of the traditional subservient activity. However, Baby Boomers referred to past secretarial roles and did not currently identify themselves as secretaries. Anecdotes of the computer being used by women to the exclusion of men suggested that the computer may have been a female engendered artefact in the past but there was nothing to collaborate that this engendering persisted and there was no evidence of the computer as a enduring symbol of male managerial suppression. Baby Boomers were secretaries but now build their own websites.

There was no such association attached to the skill of typing by Millennials who learnt to type on a computer because of a need to integrate and communicate. Note in particular the reference to *'typing machine'* by Mary as opposed to *'type writer'* which suggests a complete detachment from the secretarial legacy. Beatrice remarked at the end of her narrative: *'Perhaps in the future we won't even have to type any more. We'll just talk to [the computers] and they will type for us'.* For Beatrice typing is still a menial and servile activity.

What is the symbolic meaning?	The computer as a symbol of subservient activity
Has this symbolic meaning changed over the last 50 years?	Baby Boomers referred to past secretarial roles. However there was no suggestion that this symbolism persisted and there was no evidence of the computer as a enduring symbol of male managerial suppression.
Is there a correlation between the symbolic meaning and age of the participant?	Millennials were less familiar with the role of secretary. Although typing was a rudimentary skill and not highly valued, connotations of the computer as a symbol of subservience were not identified amongst their cohort.

Figure E - The computer as a symbol of subservient activity

4.2.2 Society as a product of the computer

It is argued that society is constructed by technology (MacKenzie and Wajcman, 1985, p.4) and that there is a reciprocal evolution with technology and society co-constructing (Garud and Rappa, 2009; Lagesen 2003, p.70). Understanding how a technological artefact changes society and/or how that technological artefact is shaped by society might give insight into the symbolic meaning of that artefact. Accounts by participants linking the computer with change were considered.

The computer as a symbol of change was obvious from the findings. The change was for some benevolent, positive and welcome. For others, intrusive, destructive and

opposed. The most common change was described in terms of interpersonal relationships, primarily as a consequence of the advent of social media.

For Barbara the computer is a device for processing information. She describes her laptop as her *'one stop shop'* for all the information she relies on to manage her business, but it is also a critical device for connection. The computer is a life line: it connects her to others. Barbara values authenticity. She believes that she projects the same persona regardless of the social media platform. She is being *'her'* and when she uses the computer to connect to others she writes from the *'heart and soul'* because that is what she believes people need to hear. She feels they need to interact with the *'real her'*.

For Beatrice, the computer is about communication: everything she does on the computer is in order to communicate. She taught children to use the computer at one stage in her career, and has extensive information processing experience dating back to her use of a mainframe at University, but now considers the computer primarily an essential tool for communication. She suggests this change is because the computer was once the exclusive domain of the few, but now everyone has a computer.

Baby Boomers reminisced about the style of social interaction in bygone years and how things have changed. This suggested the computer as a symbol of the breakdown in the fabric of community and weakening of interpersonal connections.

Bianca said she would prefer a world without computers. *'Posting letters and picking up phones and people interacting with each other'* was, for Bianca, a much simpler way of life. Bianca talks about visitors to her home who will not press the door bell. They would rather text to say they have arrived than ring the door bell, an act she describes as *'ludicrous'*. This reluctance to connect physically, Bianca believes, is a product of

computerisation where people are forming relationships remotely. She worries that we are losing the skills necessary for human interaction.

Betty recalls typed memos, which were physically handed to people. People, she says, would at one stage deny having received an email. Betty recalls a colleague sending her an email when he was sat directly behind her. The email was confirming a conversation that had never taken place. She compared it with *'people talking behind your back'*. *'Communication skills'* says Betty *'have lessened because of the advent of the computer'*. Betty thinks that sometimes people send her emails and the problem would be easier to resolve if they just talked. Talking about events, says Betty, helps her prepare mentally for them. Someone just sending her emails makes it seem that they are not really interested.

Bonnie says that one of the great dangers with computers is that people believe they are staying in touch with others *'simply by having them as a friend on Facebook'*. She said, because she will have seen a picture a friend had posted on social media, she will be unaware of how much time has passed since she had an actual conversation with that person.

Brittany thinks that people do not communicate as well as they used to and that is partly because emails exacerbate how they feel. She says sometimes she can see the anger and frustration in emails and finds that *'quite sad'*. If there is a problem she will pick up the phone and talk to the other person. Bold capitals or letters in red are not a good way of expressing yourself, says Brittany. She says she would never turn her phone or laptop off. If she goes on holiday she is always contactable. She feels switching off her connection to the internet would result in her isolation from the rest of the World.

Generation X were aware there had been a change in how people interact over recent years, perhaps anecdotally, but on the whole saw they saw the computer as beneficial. Gloria was, however, keen to protect her children. Gloria had two older brothers and they shared an Atari as children. It was simple, but it worked. They were only allowed 30 minutes a day. She applies a similar cut-off threshold to her children today and encourages them to have a couple of days without computers during the week. She will pull the internet plug from the wall and take her children out on family days. No phones are allowed at the dinner table. She is worried that without these restrictions, her children will struggle to develop the skills necessary to communicate. She wants to be a role model for her children and does not want to be seen on the computer all day every day so that they think it is acceptable. She works from home and her activities are a bit more visible to them as a result so she is conscious of the time she spends on the computer when they are around.

Generation X participants talked about how the computer had supported the cultivation of relationships. Gilly says she met her husband using the computer. He only lived 4 miles away from her but they met online. Gilly used to use Yahoo Messenger to build relationships with people in other parts of the world in chat rooms. When she was on holiday in Mexico she befriended an American couple and they have been keeping in touch over the internet. Gilly has made a decision not to befriend anyone from work on Facebook. She started using LinkedIn as someone told her it would be useful to build professional networks, but she has not posted much on there.

Social media featured in the formative teenage years of Generation X and is now firmly embedded as a component of their social interaction. The computer for the majority

was a symbol of connection and social codes have developed around its use. Typing and speaking have become synonymous.

Georgia said that the World Wide Web and ability to instantaneous message people through email was double edged. It had made a huge impact on the recruitment industry in the sourcing and processing of candidates. However, says Georgia, *'it stops you talking to people on the phone'*. She says a *'lot of people just rely on 'wacking off' an email to you'*. She prefers the personal approach and speaking to people direct.

Gertrude relies on social media to keep in contact with family and friends: *'We don't pick up the phone to each other now; [social media] is how we arrange everything; that's how we keep in touch with dates'*. Whilst Gertrude noted that she no longer conversed over the phone, she did not give an opinion on whether or not she thought this was detrimental to relationships. She observed that not having a computer would prevent her keeping in contact with people, but did not indicate whether this was something she would be unhappy about.

Grace uses LinkedIn and Facebook. She has no interest in any other social media apps and would rather *'leave that to the younger generation'*. She uses Facebook for half an hour / 40 minutes a night *'just to catch up'*. She says it keeps her in touch with the friends and relatives she does not see very often. LinkedIn is *'mainly for business purposes and building relationships and staying in touch'*.

Giselle says it is *'a lot easier to talk to people now'*. Giselle used the word *'talk'* to describe communication predominantly through text. 15 years ago, she says, *'you pretty much needed to arrange a time to speak to someone and a lot of it was done on landlines rather than mobiles'*. She accepts that the conversations are now not so in-depth, but email is for her so much easier than picking up the phone. *'Everybody has become much busier'*

she says. Another benefit has been the ability to build a team because Giselle can find people on line. *'Before'* she says, *'you just didn't know where people were or what they did'*. She credits a lot of this change to social media. She has recently recruited a new team member through LinkedIn. Most of their conversations were online. She describes LinkedIn as *'the most powerful tool in recruitment'*. Giselle is very careful about what she posts on LinkedIn. She is also careful about what she posts on Facebook - this is where her social life is reflected. LinkedIn is a professional networking site: *'You just wouldn't put your holiday pictures on LinkedIn'*.

Gwenda talks about how the recruitment industry has changed during the 20 years she has been working in it. She says that once there were local offices to enable accessibility to candidates. She has recently completed a *'massive volume recruitment'* project in the Philippines and Europe. She talks about her colleague who *'literally does everything on Skype'*. Skype, says Gwenda, allows him to *'naturally see [people] and build a relationship'*. Gwenda says she used to travel a lot but now everybody is on their mobile phones looking at job sites, so *'it is possible to place an advert online and say 'do you want to work in the UK' and people will respond'*. Gwenda talks about working in the recruitment industry and says she:

> *'...used to have a mentality that we would try and meet everybody because obviously you can build a relationship and you can also sell a candidate to a client much better if you have met them...now we try and make sure we speak to them all on Skype'*.

Gwenda says that she was once doing a lot of travelling, but now her clients conduct interviews on Skype. She says the relationship with the candidate is probably more intense. She is using Skype every day, seeing candidates face to face and says she gets quite friendly with a lot of candidates. Gwenda says that Skype interviews are not as

good as seeing the candidate in the flesh as *'it's a sort of fake situation'*. She says the industry is now more reliant on technology and less on relationships. Gwenda uses Skype to keep in touch with her mother, who is her business partner and lives in Australia half of the year.

Gwyneth says that the internet has allowed for a totally different engagement with *'different clients she would never otherwise have worked with'*. She says that she grew one of her Twitter accounts to 10,000 followers and did not know any of them.

Gloria uses social media because it is *'good for connecting with old friends on the other side of the world and things like that'*. She says she is *'not one of those people who will take pictures of their dinner, and moan about life for some sort of attention seeking stream'*. She only uses social media to *'share facts and information'*.

Gladys says that when she first started her role everything was about meeting people face to face and being physically on site: *'Nothing got done unless you could visit in person'*. She now manages multiple sites and does not visit more than once a month, simply because she does not need to. Computers allow her access to all sorts of information, whether she is in a coffee shop or a train station. She no longer has to be in the same place as where she is delivering the service. She reflects on a time 10 years ago when working at a college and having regular morning meetings, people would *'talk about what they were doing that week and the problems that were coming up'*. She says that most meetings seems to be on email now and *'you don't necessarily get the support from colleagues that you once had'*. She talks about relationships with contractors which have been weakened. She says that if a conversation is not followed up by an email *'you might as well have not had the conversation'*. She finds relationships with contractors and suppliers more difficult to build because *'you don't get to know each other in the same*

way'. She refers to the *'general chit-chat'* that people have when they meet face to face, which she thinks helps make relationships stronger:

> *'Nowadays you don't actually see people for months on end. You lose something in that relationship. Any issues come up, problems, conflicts, its harder to manage because you have not had that relationship kind of confirmed in person'.*

Gladys thinks that sometimes a conversation can resolve issues so much quicker but now *'everything has to be followed up in email and everything has to be in writing'*. Gladys has thought about webinars and group conferencing over the internet, but they do not use them because of technical and capability issues. Social media was a big part of Gladys' life at one stage but now she tries to limit use to one hour a day. She says she found she was not having conversations with the people she lives with and was ignoring people *'literally in front of [their] face'*. Without the computer, though, Gladys thinks she would very quickly lose contact with her family. She *'speaks to her family every week...but most of that is on social media'*. She is enthusiastic about virtual reality technology but says she has seen people *'literally forget to talk to the person standing next to them*'. She says its important people enjoy it together as it can then enhance their relationship. She says there is a danger that human contact is replaced by technology and people become isolated. Gloria communicates generally by email at work and *'less and less over the phone now which is quite sad*', she says, because she does *'like face to face talking to people but when everybody is located all round the world, its a bit difficult'.*

Glennis started using the internet at college and computer rooms in libraries were *'popping up everywhere'*. She started to use chat systems and saw computers as a fantastic way to communicate. She had her first email address at University and *'thought it was really useful being able to communicate with people without having to meet them face to face or give them a phone call'*. She thinks that people have *'gone too far down that route*

and everybody just sends email out and it can take weeks before you get the answer you want because no one thinks to pick up the phone'.

For some Generation X, the computer was definitely embedded as a device to communicate through, and to reach out to local and international audiences. Millennials are not familiar with a world without computers. They are being told social media is bad for them, along with excessive amounts of chocolate and alcohol, and they try to be mindful of their use of social media, but struggle to live without it.

Marie spends 8 hours a day on a computer and then plays games and goes on Facebook when she gets home, so she is using a computer for about 10 or 12 hours a day. She says she deleted her Facebook because she thought she was spending too much time on it. When I spoke to her she had *'done 16 days'* without Facebook and was proud that she had stuck to this New Year's Resolution more successfully than she would have if it had been about giving up wine. She says:

> *'...you get consumed by it and then you notice because you want to go on the app first thing and you are looking at it throughout the day at work and then when you get home from work and you are looking at it before you go to bed. It's not healthy'.*

Marie says life is nice and peaceful without Facebook. *'Apart from the odd photo somebody uploads'* of her, over which she has no control, she says it has *'been quite nice to give up and have a bit of a break'.* She is still using Instagram, Snapchat and WhatsApp. She had 400 friends on Facebook but says they were not really her friends, mostly *'people who wanted to spy on [her] life. It included acquaintances and nosey people'.* She did use Twitter at one time but thought she was too outspoken and she was trying to have a responsible job so she deleted her Twitter account. *'It's been gone a*

while'. She uses LinkedIn once a day or so because the *'marketing lady'* told her it was a good way to connect at work. She has been told what is and is not appropriate to post.

Mabel thinks that computers are ruining children's childhoods. She says that social skills are suffering and although she and her children will go out as a family, *'they spend all day with each other and just sit on face time or Snapchat'*. She says, she uses Facebook *'for work quite a lot and to keep in touch with old staff'*. She says '*If we go out at the weekend to birthday parties and stuff we put photos on but it's not something that I would sit on all day every day'*.

Myrtle says she has loads of friends on Facebook she has never met. She says when she was at University she would add everyone in the class to Facebook, and *'you never actually speak to them because the classes are so big and you never get rid of them'*. She uses Instagram a lot as well as she likes looking at pictures. Relationships for Myrtle are more an exchange of visual images than words. She says she is a very visual person.

Meg uses LinkedIn for work and Facebook socially. Meg says she likes to talk to people. Her current job is about going out to meet people and that is the aspect she enjoys the most. She goes on to say that she thinks computers are an amazing way of having conversations with people all over the world, not just in your work place.

Mallory says she volunteered to work in Malawi about 2 years ago for 3 months. She says: *'There is no electricity there, no running water and definitely no internet'. She says 'it was quite nice to have a break'*. When she came back to the UK, 'it *was as though I had forgotten how to type'*. She found it *'really weird being on a computer again after that amount of time'*. Mallory says the break from the computer made her want to talk to people more, to give them more time and really listen. She says you can tell a lot more from a person when you are speaking to them face to face through their facial expressions

and body language. She says it is really hard to get to know someone by interacting through social media. Mallory says that the majority of friends on her Facebook are people she has never met. She says when she was younger she used MySpace and talked to people she had never met. A few of those contacts have migrated over to Facebook. Mallory reflects on her time in Malawi and says that people are more connected and the community spirit is tight and everyone looks out for each other. She says she had a bigger culture shock coming back to the UK than she did going to Malawi.

Myra uses LinkedIn for work and then has Facebook to keep in touch with family who are mainly based in South Africa. She has Twitter but does not know how it works, and just uses it to *'complain to companies'*. She says: *'The guys in the office help me loads with the apps and the hashtags and things like that'*. For Myra, the computer in the office has no symbolic meaning and its significance is merely that of an amenity. She talks about her computer at work. It is faceless and featureless: she describes it as *'just a black box'* and she has *'not got a clue'* what brand it is. She says that her role is more customer interaction, face to face and over the phone. However, Twitter, LinkedIn, and Facebook are still very important to her in communicating with friends and family.

Martha says her *'other half'* is always on the internet and she *'struggles*' with this. She thinks social media causes a lot of problems for relationships: *'one stupid comment...it just gets blown out of proportion'*. She says she will *'nose through everybody else's post',* but will not *'put anything up'*.

This impact of the computer was articulated at length by participants from all generations in relation to communication. Some felt the computer had removed boundaries and led to more efficient communication, whilst others felt that personal relationships had been adversely affected. Turkle (1997, p.61) observed that for the early

computer user, the computer was exclusive and separate. As a result of connectivity, the computer now places the user within a communication network. The computer has changed in function and perhaps also in relevance to people's interaction with the world. It was initially a device to process information, then a device to connect to others.

Social media was a big feature for many participants and either significantly supported their efforts to bond or else placed unrealistic pressures and reduced personal relationships to virtual connections. Whilst the communication capabilities of the computer were embraced by most participants, a number were concerned about the darker side of the phenomenon of social media with the computer symbolising an insidious presence in the home.

Betty talks about the impact of social media on young children with the accompanying pressure to look flawless. She also talks about the porn industry and how children have access to things they should not.

Gabby says now her sons are 10 and 6 she is beginning to realise the pressure on them to look and act a certain way which comes through from social media. Gabby says that *'when we were young and had bad hair cuts and someone said something mean to us, that wasn't available on the internet for everyone to see and these days it is'.* She says *that 'school comes home with you and your social groups come home with you as well'.* She compares her IT lessons as a child, where she labelled the various parts in a diagram of a computer, with the lessons children are having to day on how to keep themselves safe and healthy when using the internet.

Gigi sees a lot of women *'posting body image pictures and how women should look'* and sees this as a *'vicious angle'* of social media. She believes that 9 out of 10 images of women are air brushed. Gigi says that a person's social media page is very revealing of

their character. People are reacting and posting *'and when you press the send button it goes worldwide'* but people are not mindful of the impact that this can have on their careers. Gigi also talks about trolls *'sitting behind a computer and ...spewing out stuff they would never say to your face'*. She talks about trolls infiltrating the home without revealing their identity and likens them to a sort of invisible intruder.

Griselda is strict about computer use by her daughters as she is worried about cyber bullying. Griselda says there is *'a lot of pressure on children nowadays because there is so much social media about and image is everything when you are a child'*. Griselda prides herself on being an individual and letting her daughters see that '*there is a value in not necessarily having to conform to what other people are doing'*.

Mary says when YouTube came on for the first time, her and her brothers *'went crazy for it'* but she thinks social media has *'latched onto us way too much as a society'* and that children today *'don't know life without it'*. Mary says social media is good for expressing your views, but the negative is that some people put too much information out there. Cyber-bullying also worries her. Computers were at one time a positive mechanism in forging relationships for her, but now the risks inherent in social media mean that online relationships are treated with much more caution.

Madeline went on holiday to the Highlands where she could not use her phone for a week. She knew that before she went and the whole point of the holiday *'was to get away from the world of social media. It was brilliant'*.

It is obvious from the above that the computer is a symbol of social connection for all generations. It is a useful tool, enabling extensive networking and efficient communication. Baby Boomers recall a time when computers were for word processing, and producing letters which were physically handed to the recipient. They are aware of a

significant change in how people interact socially and some consider computers to be a symbol of a breakdown in communities and weakening of interpersonal competence. Generation X and Millennials vaguely recall or imagine a time without computers and are aware that computers present risks to interpersonal interaction, but generally consider computers supportive in cultivating relationships.

The computer is also a symbol of over connection in its various forms, with people communicating private views publicly, children accessing information that would otherwise be restricted (pornography), and third parties making contact who would otherwise have been excluded (cyber bullying and trolls). The risks of over connection were recognised by all, but appeared more relevant to Millennials and Generation X who spoke from personal experience.

The communication capabilities of the computer have improved over the last 50 years. The computer's symbolic meaning in relation to communication and connection has developed and strengthened over the period of this study in line with technical advancement. Baby Boomers are most overtly concerned about the deterioration in social skills. The risks of over connection have arisen relatively recently, tainting the symbolic meaning of computers with insidious overtones.

What is the symbolic meaning?	The computer is a symbol of social connection, of over connection, and also of a breakdown in communities and deterioration in interpersonal competence.
Has this symbolic meaning changed over the last 50 years?	The symbolism has grown in line with developments in communication technology. Over connection is a more recent issue.
Is there a correlation between the symbolic meaning and age of the participant?	The computer as a symbol of social connection is common to all generational cohorts. The computer is a symbol of deterioration in interpersonal skill mainly for Baby Boomers, and a symbol of over connection mainly for Generation X and Millennials.

Figure F - The computer as a symbol of social connection

4.3 THE COMPUTER AS AN ENGENDERED PRODUCT

4.3.1 Engendered by 'institutional actors'

Berg and Lie (1995) suggest that technology is designed by men for men. This was evident in an account by Bonnie who talks about her efforts to track down an Atari computer for her husband, not because she wanted one, but because she wanted one for him. Bonnie recalls a time when her *'then-husband'* was *'desperate for an Atari computer with space invaders'*. She says it was *'a bit like shopping for child'*. Demand outstripped supply and the Atari was therefore much coveted. Ownership of the computer set a person apart from their peers. Bonnie said she did eventually *'track it down',* like a hunter chasing elusive prey. She goes on to say that the Atari was well received, although her efforts and the much coveted gift did not ultimately '*save the marriage*'. Rather than engendering the Atari as a male item, however, Bonnie's account arguably 'feminises' her husband, as she is the hunter, and he is the passive recipient.

A more common perception was the computer as a symbol of prestige, albeit genderless: the bigger the computer, the more coveted the computer, a theme communicated by Generation X and Millennials.

Giselle recalls a time when the large work computers were replaced by smaller computers. She says: *'They were still quite huge but at the time it was quite 'wow' we have gone up in the world because we have now got these computers'*. She saw the investment in the computers by her employer as a statement of prosperity by the business.

Gladys talks about a time when she had to share the computer with others but now she has *'access to multiple computers and there are plenty to go around'*. She has 3 computers dedicated to her own use alone and she sees this as a measure of her success in her role.

Gwyneth reflects and says: *'Nowadays it doesn't cost much'*, but it used to *'cost a fortune to buy a PC that had a bit of power'*. Having a powerful PC was once a symbol of wealth for Gwyneth.

Greta sees a computer as a tool, not just to type documents, but as an information tool for research. She would like a *'really good system'* so that she could have a webpage and update it herself. Greta said she had a Dell, but it *'died'* about 2 years ago. She would like to invest in *'...I think they are called Apple Macs... just because they look amazing, or even if it wasn't an Apple Mac a really nice computer system with a huge screen and a keyboard...or something that was really slick...something that looks really nice'*.

Mabel reeled off a list of the computers in her life: *'so I have got a laptop for work. We've got 2 tablets, 2 iPads, we've got a Play Station 4, two Play Station 3's, an Xbox 1, and 3 mobile phones'*.

Myrtle broke her right wrist when she was at primary school and she had to use the computer because she could not write. She says: *'It was definitely a perk'* and her friends were '*jealous'*. She says it took twice as long as her friends to complete the work but it '*looked good'*.

The idea of Apple v. PC was evident in several interviews with Generation X and Millennial participants. Although there did not appear to be any particular gender attachments to either brand, awareness of the dichotomy makes apparent the materialistic value placed on computers.

Gloria said she uses Apple merchandise *'for the social thing, but not for work*'. She says *'we've been brainwashed by Apple'*. Despite this, she cannot find another phone that does what she wants it to and so feels Apple have a monopoly. She says Apple are *'good at what they do but their products are not built to last'*.

Griselda does not use Apple or Mac. She says when she was in the legal sector, there were a lot of specialist applications in use and none of them worked on Apple or Mac computers. She does not have an iPhone either; she uses a Blackberry, and in that respect says she is *'a little bit behind in technology at the moment'*.

Gwyneth says she is so *'brain washed'* by Microsoft that she does not like working on Apples at all.

Myrtle says she recently changed jobs and in her old job used an old Microsoft computer. In her new job she has an Apple Mac and says: *'my god the difference it makes having a fast newer computer - it's ridiculous!'*

Mary is a big fan of Apple. She says she is not sure why but thinks it is because Apple computers are *'much easier to use and a lot faster'*.

Myra says she cannot get on with Apple products. She had an iPhone, iPad and iPod but cannot use them. She is currently using an android phone because it is simple and the buttons are quite big so she can text and call.

Berg and Lie (1995) say that women fear technology because it is designed with little thought to female requirements. Brittany openly talks about her fear of computers. She said they still *'absolutely terrify'* her, even though she recognises that she *'couldn't survive without a computer now'*. She bought an Amstrad in the 1990's, but never used it. Somebody who worked for her in the office used it. *'I am an entrepreneur'* she says, *'it's about having the right people'*. She engages people to carry out the tasks she is fearful of as opposed to the ones she considers to be beneath her. Even in 2002, she says, she was using handwritten planners and recalls hand writing out time plans for all her staff *'nearly in tears'* in her efforts to meet the deadline. She has now rationalised her fear and says it was not so much a fear of computers as a fear of doing something wrong. She now has her

whole life stored in a laptop, and developed a dependency to the point that she does not even know her husband's phone number. She says she would find it very difficult to cope without computers. Her morning routine is that she unloads the dishwasher, puts the kettle on and then goes into her office to read her emails. She checks her online accounts and does everything online. She says that it would be difficult for her to survive without a computer. Once fearful of them, she has now put her trust in computers keeping her safe.

Brittany described a fear of something that she did not understand, but was determined to conquer. She suggests that she would not know how to contact her husband without her computer and that she now has complete dependency on it, but it does what she asks it to, and she is in control.

From the above, it would appear the computer is generally held as a symbol of prestige, of success and hard work. Whilst it could be argued that prestige and success are male values, the accounts did not otherwise suggest engendered symbolism for the computer. There was brand recognition, particularly in relation to Apple, but little to suggest any engendered symbolic attachments.

What is the symbolic meaning?	The computer is a symbol of prestige, a symbol of success, a symbol of hard work.
Has this symbolic meaning changed over the last 50 years?	Accounts of the computer as a symbol of prestige were both historic and fairly recent.
Is there a correlation between the symbolic meaning and age of the participant?	The computer as a symbol of prestige was shared by participants from all generational cohorts.

Figure G - The computer as a symbol of prestige and success

4.3.2 Engendered by practical application

Users shape technology through a process of demand (Kline and Pinch, 1996) and also association (Gansmo, Lagesen and Sørenson, 2003, p.57). Baby Boomers talked about their personal challenges when introduced to computers at secondary school, university or work. Generation X and Millennials talked about their own experiences, but also about people closely associated with computer use. These were invariably family members and close friends rather than work colleagues or managers. The anecdotes were mostly nostalgic and included fond memories of family activities.

Gabby's first memory of a computer was the machine her dad bought home on which she played table tennis games. She then had an Amstrad on which she played other games. Then there was a Saga with a shooting game. The computer was a focus of family activity, a bit like, says Gabby, *'you would have played a board game years ago'* with all the family gathering around and playing together. Computers now play a big part in her life and there is a standalone computer at home with a drive for herself, her husband and each of her children. Rather than gathering around the computer to play games as a family, her husband plays puzzles, she uses it for Facebook and the children use it for homework. Computer use is now more of an isolated activity.

Gertrude recalls a computer at home. Her dad bought it with pressure from their mother. She and her brother claimed they could not do their school work without it but used it primarily for games. She shared the computer with her brother and they had allocated times for use. She then discovered MSN and started to message people. She recalls her parents were also using the computer to play games. The computer was the focus of social and leisure activities.

Griselda's earliest memory of a computer involves her father, because he used to work for IBM. He was a field engineer and when he was on call at weekends, Griselda would go out with him. He would bring home reams of green striped paper and used punch cards for Griselda to draw on. She says that IBM was a brilliant company because it provided a fantastic Christmas party for all the children, Christmas pantomimes and ice cream. Her father, she says, could be described as *'a bit of a workaholic'* and her parents divorced when she was a teenager. She says she started to read articles about IBM and the company's reputation as marriage breakers, because so many of the engineers worked such long hours. Griselda says she is not sure if his job was the real reason for the marriage break up, but he worked long hours and weekends and he *'loved his job'*. Griselda loved languages and was offered a role working for a large accountancy firm in their European support centre. They were looking for an employee with language skills and the potential to learn new skills. She helped set up the firm's first IT help desk and then started training people on IT. She found technology *'easy'* and described it as an exciting time to get involved with technology because things were changing so quickly. She then moved on to a law firm and became head of IT.

Gwenda and her sister were bought a *'sort of Nintendo'* and used it at home for playing games indoors. She used to go outside and play as well, and it was not as though her parents could have punished her by denying her access to the computer. She says *'It would never have crossed [her parents] mind to use the computer to discipline [her] or anything because [she] would have just have said 'OK fine' and gone upstairs and played with something else'*. The computer is a big part of her life now. She describes it as *'beyond useful'*.

Gwyneth's first memory of a computer was a huge computer bought by her dad mainly for his research when she was 12. She says *'you had to dial in'* and *'it had a lovely beep tone'*. By the time she was 15 she says she *'was a star in coding'* and *'sorting out everybody's computer out and around us in the neighbourhood'*. She now spends most of her working day behind a computer and has a laptop and PC at home. She says as soon as she is behind the computer she *'feels comfort'*.

Madeline's mother was a teacher and that, she says, is why there was a computer in the house. Madeline could not see the point, whereas her mother got quite excited about it. Madeline said they had a family email address with all their initials in. She never saw the point of computers until friends encouraged her to use one. She is not great with technology.

Mildred's first memories of a computer are of her brothers playing games on one. Mildred says the primary purpose of the computer in her home was to entertain. She uses a laptop at work, and there is a PC at home, but she only uses this if she is researching for an assignment as a part-time student.

Mary says she was around 6 years old when she saw her first computer. Her brother had just purchased a Mac computer which she saw when on a visit with her mother. Mary says her mother *'got so excited about it'* and *'was convinced she should have one'*. Mary used to go to work with her mum and remembers her mum *'on the computer much more often than anyone else in the family'*. She says her mother was very influential to her and seemed so competent in using computers compared to others, but computers never really interested Mary.

Mallory's favourite computer is the one she is using now. She says it is not because her father bought it her as a reward for giving up smoking, it is just that it is newer and better than any other ones she has had.

Martha spoke about being 'huddled' with her brother and her sister *...around the ...old fashioned computer'*. Her brother was *'a big computer fan and had every console going'* and he encouraged her and her sister into gaming. She then spoke about her step father who had a computer, a *'massive noisy'* computer, a *'monstrosity'*. She hated it: *'all you could hear was the whirring of the fan'*. There were arguments at home about the computer and *'if anybody went near it or if anybody moved anything on his desk...we would all get accused of being on it'*. She says she did not use the computer but *'might have cleaned around it'*. She says she thinks the computer was her step father *'marking his territory'* and the computer played a massive part in the deterioration of the relationship between him and her mum as *'he would become very focused on the computer'*. She says he had to have *'the biggest and the bestest one going'* and had loads of PC magazines *'hanging about'*. She says *'it was more the males in the family that had computers'* and she and her sister played with dolls. It *'wasn't [her] first instinct to go to a machine'* but her brother *'was obsessed'*. She said IT was not one of her favourite lessons as she *'has never been that way inclined'* but she did well in the final exam at school. She has needed to use a computer more for work recently and says she probably has never given herself credit for what she can do on a computer. Her skills and confidence are increasing daily. Martha's account suggests a definite link between prior experience and a later aversion to computer use. She is, however, becoming more accepting of the computer through repeated use at work and now thinks the internet is *'fab'*.

There is evidence of early experiences colouring a participant's approach to computers in later life and some suggestion that the computer holds meaning beyond its practical use. The computer held family connotations for Generation X and Millennials, but not so Baby Boomers, who would have been unlikely to have had a childhood exposure to computers. Where computers were symbolic of supportive fathers, the participants had an affinity with computers. Computers symbolic of mothers with an enthusiasm for computers appeared to have had an opposite effect on participants who were less interested in computers suggesting that the computer is for them a symbol of inadequacy in comparison with their mother. Whilst the computer held symbolic meaning in relation to male family members, it was in their capacity of a family member, rather than an individual with gender. Once again, there did not appear to be a strong engendered symbolism.

What is the symbolic meaning?	The computer as a symbol of family.
Has this symbolic meaning changed over the last 50 years?	Childhood memories of the PC as a focal point in the home was apparent in narrative from Millennials and Generation X but not for Baby Boomers. The home computer was fairly rare during the early decades of this study and would therefore not have commonly been linked to a family activity at that time.
Is there a correlation between the symbolic meaning and age of the participant?	Baby Boomers were likely introduced to computers during their senior school years or early career. The computer as a symbol of family was most prevalent for Generation X and Millennials.

Table H - The computer of a symbol of family

4.3.3 Engendered by its users - the 'computer geek'

Lagesen (2003, p.71) Margolis and Fisher 2002, Woodfield 2000 and Gansmo et al, 2003, Lœgran (2003, p. 201) all refer to a close association of masculinity and the computer, something also known as the *'hacker impact'* or *'geek mythology'*. The

perception of a computer as a *'man-thing'* was evident in this respect from the narrative provided by all three generational cohorts.

Lie (2003a, p.25) and Lagesen (2003) refer to an expectation that men are more technical and women are better at communication. This was a sentiment echoed by the participants from all generational cohorts. Participants from all generations appeared to have navigated careers away from technology and towards people orientated professions for that reason. Ironically, computers are a primary communication tool, and therefore feature heavily in the lives of these participants.

Beatrice could code and she had a high aptitude for numbers. Asked if she would have liked to have been a computer programmer, Beatrice said 'no', and that her intention was to be a teacher and work with children. She has since built a successful career which involves complex administrative activities and worldwide communication using a computer.

Barbara says her son is a lot faster at solving technological problems than herself. She said technology used to frighten her but it doesn't any more. She says she will figure out the solution to processing problems and it takes her a lot longer and sometimes she would rather get someone to solve the issues. She does, however, have the kind of brain that wants to know how things work: when the vacuum cleaner breaks down, she takes it apart and tries to find out what is wrong with it. She says she can change a wheel, but chooses not to as she does not like to get her hands dirty and would rather phone a mechanic. Barbara is comfortable with creating websites and typing up documents but has no intention of learning about configuring hardware. She referred to a situation where she was getting help from a friend and they were saying she had to *'go behind the scenes'* to sort out the problem. She said it was all *'too much hassle'*. She was not interested in that

and got her *'laptop guy'* to sort the problem out. Barbara said she passed a test to become a programmer once *'with flying colours'* but *'just couldn't bear the thought of sitting in a room [on her own] working on screens and things'*. Women, says Barbara, are more the creative type: they will build websites, but the programming is left to men. Ironically, she spends much of her working life in a room by herself working on screens, but is creating and communicating, and not programming.

Belinda was aware in her early 20's that *'gaming became a thing'*. Her husband had a computer at home and her two sons are *'massive gamers'* but she has *'never actually played on one'* for pleasure, just when supervising children in a care setting. Games consoles and computers are in Belinda's mind completely separate. Her sons are excellent at gaming, says Belinda, but not proficient *'in terms of general day to day usage of the computer'*. They come to her for support in updating their CVs on Word. Belinda saw administrators use computers when she first stated work and then when her husband got a computer purely for gaming she became aware of the social side of computers. She is amazed at how something that is played on is bought into the work place. Even now Belinda's husband is 50 plus, he still plays socially with her sons who live away from home. Her sons have got friends abroad whom they regularly communicate with because they have met in gaming forums. Belinda says she has never played on computers *'because there is a lot more to life than being sat by a computer screen'*. She then admits to having played the odd game of solitaire.

Bonnie was the only girl opting for computer studies GCSE in her year at school and held her own amongst her male peers. She *'kicks'* herself, as she did not *'foresee the direction that computers were going'* as if she had she *'would be earning a lot more money'* than she is now.

Griselda says that some of her friends think of her as a computer geek as she has held so many roles within the technological sector, but she is clear that her remit has always been about the business relationship, the service delivery aspect and the people aspect. She credits her success with being able to translate what users ask for into a language that developers can understand. She says that a lot of *'our lawyers'* were *'fantastic at arguing and negotiating and discussing and putting forward logical arguments, but...technology didn't always make sense to them'.* She says her strengths are empathy, understanding and listening skills and describes her roles as *'piggy in the middle'* type roles. She says that very often it is about understanding their business and making sure they understand the benefits of technology. Technologists too often promote the features and not the benefits. Griselda says that it was *'part of her role to be someone that anybody could call up and ask for help'.* She goes onto to say *'it was her job to be approachable'.*

Griselda says that when she started in her role, the majority of developers were male, but *'as time moved on there were a lot more female developers'.* She feels there grew to be a more reasonable gender split in all areas of the business and points out that her CIO was female. Griselda says it was quite unusual at the time to have a CIO who was female, but she did not realise it. *'She had worked her way through the ranks'* as Griselda had done. Griselda says she never felt there was a glass ceiling. She says that her original technology team were all female. Her team were doing the *'user facing stuff'* and development was being done by another team. Griselda says she got promoted both times whilst she was on maternity leave although there was a time the person who was covering for her tried to take her promotion away. Griselda says she was a *'bit miffed'* about that. She does remember one glaring piece of sexism when she was part of a team discussing

bonus payments. One of the team suggested an employee was paid a bigger bonus because *'he was a man and had a family to look after'*. Griselda says the high proportion of females in the IT departments of the companies she has worked for may be due to her working in the legal sector. She talks about an *'us and them'* culture where anyone who was not a lawyer being considered a second class citizen. She thinks this may lead to male IT professionals *'feeling uncomfortable with that and not staying in the sector as long as women'*.

When asked if she would have liked to have been a computer programmer, Gabby said that *'funny enough, as much as I enjoy technology and I understand systems and things like that, I much, much prefer people. I like interacting with people. So I like to coordinate systems rather than do the completely clever stuff with it'*.

Geraldine did well in Information Studies at university. It made sense to her when she was reading it so she *'sort of picked it up like a sponge'* but she did not want to be a computer programmer: she's not *'geeky'*. She thought it was a boy's job. She wanted to do something more, did some cabin crew training, and ended up in insurance and then HR.

Glennis has always been comfortable around computers, but never wanted to be a computer programmer. However, she thinks her experiences have given her enough knowledge of computers to enable her get along with the IT team at work. She says she can *'nod because she has a bit of an idea about what they are talking about and can pull them up if they are trying to tell [her] some story'*.

Gloria has recently set up her own brand and learnt a lot about the workings of a website and the back office. She says she is not great at coding and would rather leave it to the professionals but finds it *'fascinating to try and keep up to speed with technology'*. The role of computer programmer is *'too techie'* for her. She prefers people.

Asked if she would have considered a job as a computer programmer, Gwenda says an emphatic *'no'*: she has always been interested in people. She works in recruitment and much of her work involves computer based research and communication by Skype and email.

Griselda says that a lot of the programmers she knows are *'introverted and quite reclusive and often quite difficult to communicate with'*. She says these are the people she would often work the hardest with to nurture relationships so she could get the best out of them. She thinks computer development might be a bit more fun these days as there is a great call for *'fun stuff'* like games and apps *'whereas developing a payroll application is seen as a bit boring'*.

Myrtle never wanted to be a programmer as she is more of a *'visual person so sitting down and writing code and stuff to do programming'* is not of interest.

Mallory enjoyed computers at school but wanted to get a job helping people. Her brother *'knows loads about computers'* and she thinks that men generally know more about computers.

Meg says she does not like things *'behind the computer'* like coding: *'It just all seems really difficult and not something that [she] would be interested in'*.

Mary says she remembers playing on the computer with her brother *'war games and stuff like that'*. She thinks computers are very useful, but *'there is more to life than just a screen'*.

Mabel's favourite computer is the laptop she uses for work. Her partner plays on his Play Station 4 only 3 times a week but *'he is on it for along time'* and *'if he has a game, he will do a couple of levels'*. Mabel's daughter has an Xbox and she plays that every single day. Her son has a Play Station 3 and he plays that every single day. Mabel used to

have a computer to play Mario when she was small, but would only pick up the console when it was raining. Her partner bought her a Play Station 3, but she only played it for an hour. She starts using her laptop from 6am until around 5pm at night. She is not really into technology and mainly uses it for browsing, booking holidays and online banking. She uses Facebook to keep in touch with old staff.

The link between maths and computers was evident in a few of the interviews. For example, Beatrice could code. She had been introduced to computers through the calculator and had a high aptitude for numbers. She attended a girl's school where she says: *'we were quite pushed into doing science things or maths things or things like that'*. She says she studied maths at university and that *'everyone expects you to be a maths teacher after qualifying'*. It was as a maths teacher she got the opportunity to teach computers to children.

Myrtles first memory of a computer was in primary school, where it was a treat to be allowed to use it to play games on Fridays. She recalls maths games.

Myra enjoyed maths and science at school, but had no interest in computers.

Mildred used computers to edit and calculate. Maths was not one of her strong points. She says this was because the maths teacher weighed everyone at the front of the class during one lesson. Because she was sporty, she was heavy, and she felt humiliated by the experience. She despised going to maths after that. She analyses large data sets with the use of the computer. When she is typing in formulas, she knows what to type in the box, but does not have the confidence to do it alone, so the computer helps her with this. It was as though she was gaining confidence in her mathematical ability with the support of a computer.

The concept of maths for boys and languages for girls was explicit for Gladys who was interested in maths and would have *'loved to have done something formal'* but *'we were all girls'*. She told her dad she was gong to do a maths degree, but he was insistent she studied English. She completed the English degree at University, and when she was 21 started and completed a maths degree with the Open University.

Generally, when participants talked about using computers for communication, they were adept and confident. When they talked about using computers for gaming or for programming, that was not their domain and there was an enduring concept of male prowess in terms of technical capability. Even with participants who were competent mathematicians, the male geek mythology prevailed in relation to computer use for programming and gaming.

What is the symbolic meaning?	Using a computer for programming and gaming is a symbol of male technical prowess
Has this symbolic meaning changed over the last 50 years?	This symbolic meaning was evident from narrative relating to periods throughout the term covered by the study.
Is there a correlation between the symbolic meaning and age of the participant?	The symbolic attachment was relevant to participants from all generational cohorts.

Figure I - The computer when used for gaming is a symbol of male prowess

4.4 THE COMPUTER AS AN ACTIVE AGENT

4.4.1 Replacing the workforce

The computer was commercially marketed as a means of achieving efficiency and cost savings. The investment in the computer was justified by the savings in labour costs

(MacKenzie and Wajcman, 1985, p.4). The computer did not represent a threat to job security to any of the participants, although references were made to colleagues who had lost their jobs by Generation X participants who accredited their professional success, and perhaps career survival, to their adeptness with information technology.

Without computers, Gladys does not think she would be able to do her job. She would need a team of 4 to 5 people doing it with her.

Grace started work at a business that had a huge IT department. She saw it change from Kalamazoo cards and perhaps 30 data entry clerks: *'a huge department of men and women just sat there entering data'*. By the time she left 25 years later there were about *'3 or 4 doing it very differently'*. Grace added *'unfortunately, I have seen a lot of loyal skilled dedicated employees lose their jobs because of technology and I suppose in a way it's a little bit sad'*.

Gigi was involved in a 4 year project implementing a computer system nationwide. She said the first reaction when she introduced the system to her colleagues was *'...fear. It was 'oh, no, not another new thing' and it was fear'*. They were frightened because it meant change, but also frightened because it meant job cuts. Gigi's role was to train and encourage her colleagues to use the new system and she believes once the system had been introduced, and people had got over their initial fear, people started to get interested in the system. Gigi does point out that this was more likely to be men than women, suggesting that the system was not embraced by all. It was in the second year of the project that *'they decided they needed to start making cuts to staff'*. There is no remorse expressed in relation to her part in the professional demise of her colleagues.

Marcie says that as things got quicker, the work of an admin team that used to be done by 4 people could be done by 1 or 2. This added efficiency is a good thing for Marcie who is keen to demonstrate efficiency savings to her manager.

Whilst the computer is seen as a symbol of efficiency and effectiveness, there was no indication of the computer as a symbol of masculine dominance cleaving departments of women workers. Rather it was a genderless symbol of rational business reorganisation indiscriminately impacting on a workforce comprising both sexes.

What is the symbolic meaning?	The computer as a symbol of efficiency.
Has this symbolic meaning changed over the last 50 years?	There was no evidence that this meaning had changed over the period covered by the study.
Is there a correlation between the symbolic meaning and age of the participant?	The symbolic attachment was relevant to participants from Generation X and Millennials

Figure J - The computer as a symbol of efficiency

4.4.2 Deskilling the workforce

Webster (1996, p 15) suggested that the implementation of computerised technologies allowed a skilled workforce to be replaced by an unskilled and cheaper (feminised) workforce.

Betty suggested that the computer had lead to a deskilling of the workforce in terms of ability to draw. Betty's first memory of a computer was a computer in a graphic designer's office *'gathering dust'*. This was because computers were *'relatively inflexible'* - it could draw a straight line but not a curve and was basically ignored as incompetent. But

now computers are so powerful they *'will actually drive you to work'*. Betty does not like the thought of this. The balance of power has changed. Computers are no longer relegated to the dusty corners of the office; they are taking control of our destiny. She said she has noticed that when she has asked for images, unless it is already created somewhere on the internet, people cannot draw it and there is an over reliance on internet image libraries. She is concerned essential skills will be lost as an overreliance on the computer develops.

Gilly is excited about the potential things in the pipeline but also concerned about the economy and jobs. Driverless cars, she says, '*are very exciting, but people earn their living from driving'*. She thinks people will become incapable of carrying out basic tasks because we expect technology to do it for us.

These were isolated expressions as participants more likely talked about links between the computer and the cultivation of additional skills, suggesting that the computer has been an active force in creating a more skilled workforce.

As Belinda's career progressed she became more office based. As a service manager she had a desk top computer. There was no formal training. She needed to pass a computer exam in order to qualify as a social worker, regardless of how good she was in other aspects of the role. There was no formal tuition, just *'a lot of trial and error, a lot of losing documents, a lot of not really understanding it, shouting help of colleagues who maybe had more knowledge and were more able to use them, but trial and error really'*. She says: *'All of a sudden'* everything Belinda was doing was on email. A need to develop report writing skills followed, once again without any formal training. Belinda talks about attempts to standardise document formats, and how this was a continuous battle because *'everyone had their own way of doing things'*.

As she can now work from any location, Gladys does not have to travel as much as she used to. This has freed up time for her to study, which she does online, without having to attend a physical classroom, and without the need to carry heavy books around. The computer has allowed Gladys to access training courses she would not otherwise have been able to participate in.

For Griselda, her technological knowledge has conferred on her status through her work. She says that *'compared with other women in business'* she is *'comfortable with technology'* because it has been part of her life for so long. Griselda says that people do not appreciate how *'pervasive'* technology is. She refers to her time as Head of IT attending weekly office meetings: *'The Head of IT would take away almost every action point because technology was such a key part of everything we do'.* Griselda reflects and says *'I love technology'.*

Gigi describes her first experience of the computer. It was a 4 year project in which she worked with an IT team introducing a new system to her organisation UK wide. She recalls it was her first experience of change management. It was a *'brand new system'* and she watched her *'colleagues who were IT geeks'.* It was not just the programmes that were being introduced. She recalls the team laying cables and introducing the internet. *'It was interesting, really daunting, but interesting'.* After that, she just used computers for *'typing, for documents, for Word and Excel documents... to type up notes and things like that'.* She feels she should learn more about computers but she does not have the time: *'As long as it does what I need it to do then that's fine'.*

Georgia's first computer at work was when she joined a recruitment agency and she had a *'massive big bulky'* thing with a massive monitor and separate keyboard. Georgia says she remembers playing solitaire on it. She recalls loading clients details on a system

which was *'quite slow, quite cumbersome'*. Rather than deskilling her, however, she feels the computer is significant learning tool.

Griselda uses a computer a lot. A lot of her client calls are made through the internet. She writes articles and blogs and uses it for research. She created a basic website but believes in getting specialists to do specialist jobs, and website design is not one of her specialisms. She does her own maintenance though. She is planning a virtual conference. She runs coaching session and work shops, so she does meet face to face with people some times, but the computer is a large part of her working day.

Gabby had little to do with computers in her first job at a recruitment agency. They would fill in candidate details on a card and store them in a box in the middle of the desk. They did not do much on computers. She recalls trying to write a procedures manual on a computer, *'typing in everything that happened in the office to try and get it systemised so there was a flow of work'*. There was no network and no emails. She then moved to a marketing agency where records were being kept on a computer database of every contact made with a customer. Computers gradually became a more common place tool until in her last role she had two screens and the systems had developed to an almost paperless office.

Greta started inputting repair requests; she then moved into training and input information about programmes, booked on employees, and stored information relating to training events. She has used a computer consistently in every job she has had. About 8 years ago she was appointed to an organisation to implement a new HR/payroll system. She describes herself as *'not the most savvy'* when it comes to computers but worked closely with the IT specialists doing data cleansing and a little bit of coding. She was made redundant from that role and went on to do some data cleansing for another

organisation. She describes that role as *'quite boring'* but understood the need for complete accuracy.

Google was mentioned specifically by 12 participants. (6 Millennials, 3 Generation X and 3 Baby Boomers) Participants either condemned or adored it, but regardless accepted it as route to acquiring new knowledge and skill sets.

Barbara needed some help in building her website, and *'google-ed'* free courses.

Betty was conscious of the impact of computers on multifarious aspects of her life. She said computers had *'changed the way that we speak and so we've replaced the word 'search' by the word 'Google''.* Betty goes on to say that her oldest son likes to read, but if he needs to know something, he just picks up his phone and uses the search engine.

Bonnie believes that her experiences of computers as technology has developed have given her an advantage over younger generations and this has furnished her with the knowledge to *'know the question to ask Google to get the answer that you want'.*

Georgia uses Googlemaps to find out potential commuting distances for candidates to clients. She admits that she is 'scared' by new things, but then remembers *' I could actually just Google how to do that and then it doesn't seem as difficult'.* Knowledge is important to her and she is confident of conquering any situation she has knowledge in. She says she will use Google as *'you can just Google how to do anything'.*

Glennis said she was explaining to her young niece what an encyclopaedia is and how important it is to know how to spell things so that you could look them up. She said now *'you don't need to spell it right to put it into Google because the computer will spell it correctly for you and then find it for you'.*

Myra talks about how as a teenager she would use her grandparent's encyclopaedias to get information and how this set her apart from her peers who knew how to use computers.

Gwenda says *'Google is just the most useful thing ever. I use it all the time to learn how to do things if I don't know how to do it, or if I don't know the answer to it.'*

Madonna said '*I feel like all the answers are there like you are just able to Google everything and it's out there.... so yeah, research, makes me more knowledgeable,'*

Marie said *'what on earth would we do without Google'*.

Mary said *' you can type in your name in the Google and you can be popped up and anyone can know your business ...and that is kind of the scary side about social media I guess'*.

Maud says *'I didn't know what auto sum is so I google-ed it and I can now tell you what auto sum is ...so I used my brain. '*

Myra says '*I must Google things at least 10 times again...without Google, I would just be lost....you don't realise how much you actually do rely on it'*.

Although there was some concern expressed that computers limited learning, the majority of participants considered the computer a challenge that stimulated learning, a support tool that aided learning, and an access point to a vast array of knowledge on a broad range of topics to support learning.

What is the symbolic meaning?	The computer is a symbol of learning and knowledge
Has this symbolic meaning changed over the last 50 years?	Concerns about the computer limiting our ability to carry out certain basic tasks and an over reliance on the computer as a source of information relate to fairly recent technology.
Is there a correlation between the symbolic meaning and age of the participant?	The symbolic attachment was relevant to participants from all generational cohorts.

Figure K - The computer as a symbol of learning and knowledge

4.4.3 Dividing the workforce

Cockburn (1985, p.7), and Gansmo, Lagesen and Sørenson (2003, p.38) refer to gender segregation of the workforce through the use of technology. This was apparent in the accounts from Baby Boomers and Generation X participants where the ability to type set them apart from their male counterparts.

Bonnie talks about her experience in the construction industry which she says is quite male dominated. She talks about a Managing Director who would shout at managers if they started to use computers: *'Hands off! That's what we've got administrators and secretaries for'*. Bonnie says there was a clear female/male demarcation line in the construction industry *'Males did the product development and technical side of things and somebody else typed stuff up for them'*. She says there is still a divide in the office and remarked on how good it was to have a man join the team recently. She thinks there is *'no sort of stigma attached to a man at a keyboard'* and that she sees *'people that wouldn't traditionally use keyboards as fast and proficient and efficient as any female might have been'*.

Gloria says typing was taught at school. She says *'only girls were allowed to have that class in school'*. The boys did carpentry. She adds that *'the girls did carpentry as well which [she] never really understood'*. She says this explains why a lot of men type using just one finger.

Griselda recalls a computer at school which she says *'looked very boring and uninteresting'*. She says *'they were just typing up lines of code which was dull as ditch water'*. She says she remembers a sense of *'come on boys you have a play while the girls go and do something else'*. She says that technology was for boys and not for girls, and goes on to say *'but I've never really been one to stick to the rules from that point of view'*. Griselda went on to study languages at University. IT degrees, she says, did not really exist at that stage and if they did she thinks they would have *'sounded a bit boring'*. She later became Head of IT.

The *'technology for boys'* theme was repeated by Gigi. Gigi says she *'loved a challenge'* and had *'always been a very curious person'* so when a project *'involving training and travelling around the country'* arose, she was keen to volunteer. She worked with a team of *'IT geeks'*. The team was *'full of men'*. She believes this was because *'when you are at school as a female, you are not driven to do the technical side. You are more likely to do the secretarial role, the admin or the nursery nursing, and the boys are more driven to do the IT and what you call the 'men stuff''*. Gigi tried to get involved in that side of the project but was not keen on the *'crawling on the floors, laying the cables and dealing with the issues of power'*.

The division between the person inputting the information and the computer or the resultant report was also remarked on with participants.

Beatrice talks about big machines in big rooms that she was unable to physically touch. The computers were in another room. There was a protective screen. She was not permitted to access that area and be in the same space. The computers were kept away behind locked doors, to protect them - or perhaps to protect Beatrice from them. The only means of interaction for Beatrice was through punch cards. Bonnie also refers to separateness from the computer, a divide. She would fill in forms generated by computers and then those forms were taken back by the IT department and information input into the computer. There was no response; she was just feeding in information.

Belinda left school without any knowledge of computers. Computers began to encroach on her professional life when she was required to provide data for the computer and she speaks about her frustration at having no feedback from this one way process, perhaps begrudging this non-reciprocal relationship. Belinda recalls that around that time her husband had a basic computer at home. It was *'a massive piece of equipment'* that was in her dining room and resented that it was *'taking up space'*. She had to dust around it. She describes it as a *'massive monstrosity with a huge tower'* and says with a hint of jealously that her husband was *'absolutely obsessed with playing games every night'*. It was an obstacle to her relationship with him - it separated her from him.

Another interesting divide that became apparent from the data was that between generations, in that younger participants were expected to be more technologically savvy than the older ones.

Betty says people think she is much younger than she is because of what she does. She uses social media. She refers to a friend, 11 years her junior, who advertises herself as a social media expert: *'she has no idea whatsoever'* says Betty. Betty has got about 15,000

followers over 2 Twitter accounts but her sons, aged 26 and 18, are not involved in Twitter and *'just don't even get it'*.

Bianca says she feels like a technological curmudgeon and is feeling pressure to *'get on Twitter and embrace Facebook'* with a tension between '*do I want to do this or should I do this'*.

Bonnie developed a love of working with data and databases when studying for her GCSE in computers. She is confident in spreadsheets, word processing and databases and self taught. She attributes her success to her earlier programming experience. For Bonnie, computer usage is so much easier now than when she first started her career. For example, word processing packages relied on control functions. Bonnie believes her early experience of computers, learning to code simple games, working with word processing packages that required function commands, and designing databases using rudimentary software applications, has given her an advantage over the younger generation. She believes she has a deeper understanding of how things work. She believes children need to understand and be involved in the technicalities of computers, rather than just passively playing.

Brittany says when she was 49, a lot of people around her were competent in computer use and she felt really *'stupid'* that her knowledge was so little and she did everything so slowly.

Geraldine says that she *'really got it'* when she was younger. She understood computers and would fix them for friends and family *'not to the point that [she] would pull them apart, but certainly when they needed to reboot the source key or whatever or reinstall a piece of software'*. Geraldine said: *'I got it. I did get it. It was fine'*. But now Geraldine recognises there has been a lot of change over recent times and is frightened of

the change that will come. She says *'I'm probably going to be one of those dinosaurs who have to go onto some sort of computer training course to learn how to do all that stuff'.*

Glennis said she was watching a programme on TV recently *'when they were asking teenagers if they can identify which noise is the dial up tone to connect to the internet and they didn't have a clue'.* She says she remembers it as: *'so much fun wondering whether or not it was actually going to connect'.* Glennis says that the internet *'made life much easier because before that things just got lost in the post',* but on the other hand *'trying to explain to somebody where the search bar and address bar are...can be challenging'.* She says it was *'a learning curve of how the slightly older generations were not quite PC literate'.* She looks back now and says it is terrifying seeing how much has changed and laughs at her attempts to explain to her young niece what an encyclopaedia is. Glennis mentions that she has a new phone and she can control her new boiler using her phone.

Social media, for Gilly, is largely a good thing. However, whilst she is familiar with LinkedIn and Facebook, other social media, such as Snapchat, and Instagram are the domain of the younger generation and potentially overused. She says her niece uses Snapchat and when she has her family around, her niece will be '*on the phone all the time and taking photographs of herself*.' In some respects, says Gilly, it makes her feel a bit old, because she '*just does not get it'.*

Gloria says she prefers to leave technology to the people who know best. She knows *'how to use a phone and a computer'* but it *'scares'* her as she gets older that she is going to *'lose touch a little bit'.*

Greta describes herself as having *'a fairly good working knowledge'* of computers *'but not as expansive as colleagues who have probably grown up from birth with systems'.*

Colleagues have told Madeline about how, before computers, they would *'fax over CVs and go through the Yellow pages'*. She says this seems *'absolutely daunting. So much more complicated'*. As a recruitment consultant, she uses databases to track everything that she does during the working day.

It is obvious from the above that the computer is a symbol of segregation. It marks the division between genders, the skilled and unskilled, the knowledgeable and the ignorant, the old and the young. It is, however, a symbol of the divide and not of the other side. It therefore represent a neutral partition as opposed to a barrier to one side. Whilst the computer marks a division between men and women, there is little to support the suggestion that the computer is a symbol with masculine connotations.

The computer as a symbol of division was shared across all cohorts, although the basis on which it segregated, separated and broke up groups differed according to generation, with some groups referring to the teaching support, others to memories of technical developments and others to the choice of communication application.

What is the symbolic meaning?	The computer is a symbol of division
Has this symbolic meaning changed over the last 50 years?	The computer has been a symbol of division throughout the period covered by the study.
Is there a correlation between the symbolic meaning and age of the participant?	The symbolic attachment as a partition was relevant to participants from all generational cohorts.

Figure L - The computer as a symbol of division

4.4.4 Liberating the workforce

Wajcman (2007) and Banyard (2001) considered there to be libratory aspects to computers as technological developments empowered women by improved flexibility and networking.

Belinda says she has found computers liberating because they have enabled her to create professional looking documents in a short period of time and, for her in her current role, presentation is very important.

Betty saw a career with computers as an opportunity to spend more time with her sons, working from home. She bought a desktop computer in the 70s with the intention of setting up a small business, but realised her children were more adept with the machine than she was as she was still going out to work and they were playing on it. Betty says the reason she has worked so hard was it was only her and *'sink or swim'*. She thinks if she had been born a man, she would have found her feet a lot quicker. Betty worked in marketing, an industry that was mainly men. She thinks this is because the sector is highly technologically dominated and this frightens women. Betty says she sees when she talks about what she does *'girls' eyes glazing over',* not because they are not interested, but because they are terrified. Betty says they are *'oh, you're so brave'*. This is not true, says Betty, she *'just needs to eat'*. Betty was at one stage employed and presenting innovative ideas to her bosses, but they *'would simply not entertain'* the concept of online magazines. Betty thinks if she had been born a man, her bosses would have listened to her. They would not have had so many staff and would have had a number of websites going.

Barbara pointed out that computers have become lighter and less bulky, so easier to carry from place to place. Another observation by Barbara was the change in availability of computers and that flexible working has been facilitated not only by the portability of

devices, but also because the user is more likely to have access through a unit at work and another unit based at home. *'In the early days'*, remarked Barbara, '*it would be a unit at home or a unit at work, not both*'. Barbara's favourite computer is her current laptop, which is *'a dream to use'*. Barbara said prior to her current computer she had a laptop but tripped and broke it. She was able to transfer all she needed to her new/current laptop but was without a laptop for a while. She says that the laptop is the one thing she would grab in the event that her house was on fire - because it *'has got [her] life and [her] music on it...everything else is replaceable but that is not'*. The laptop is very important to her as a symbol of her freedom and it signifies her status as a *'lifestyle entrepreneur'*. She describes here laptop as *'just part of me'*. She says she tends not to take it away with her and when she comes home she will sit at her desk and be *'so happy to have [her] laptop'*.

Brittany talks about comptometers and *'proper typewriters'* nostalgically, but her favourite computer is her iPad Air because it is so light to carry around and she can move money wherever she is. She can also keep in contact with everybody.

Gigi thinks that computers are more *'female friendly'* these days. She feels that the people who blog and use Twitter are mainly female and that more females are using social media to *'sell their products or to sell their services or to get their message across'*. She feels computers help women get a voice in a male dominated field.

Georgia's completed a degree at University, but all of the work for that was handwritten, other than the final dissertation which she paid a friend to type up for her. She initially talks about her first job, working for her father, being in an environment where there was no computer system. On reflection, she recalls, there was actually a computer system, but it was so *'prehistoric'* she did not really consider it to be any sort of

technology. She has recently started out a self employed consultant. She has got her own computer and phone *'and that's all you need to do everything'*.

Geraldine talks about how she was getting *'more savvy'* with computers at the point at which the internet *'started to be more available'*. She started job hunting from a PC and this *'opened up her playground'*. She stated to apply for jobs in Manchester and London and think about relocation. Computers have also given her the freedom to attend webinars, listen to conferences, read, access the latest HR information, and network to a certain degree, despite the lack of support from her employer to pay for seminar attendance and support her in keeping her knowledge up to date. She covers a regional role and travels across seven sites. She says that she *'literally find[s] an empty desk and perch[es] and make it my desk for the day'*. Geraldine's favourite computer is her laptop *'because it is portable, its there when [she] needs it, but equally [she] can switch it off, shut it down and put it away'*.

Glennis's favourite laptop is her iPad. She says: *'It's really handy. It's so compatible, you can take it everywhere...and this means it's excellent for ironing as well because [she doesn't] have to bring [her] iron to the computer*'.

Mary prefers her iPad to a laptop because it is like a computer but its *'smaller, handier and easier to take about... you can watch telly on it as well'*. She says the iPad is a lot cheaper than a laptop.

Participants describe how computers impacted on their life, a common theme being in terms of mobility. The place of work has become less of a physical location and more of a location incidental to when a person is carrying out a particular task. This has conferred enhanced freedom in the form of flexibility, but adversely as the boundaries of the workplace have become blurred, the dividing line between work and home life has

been eroded. Work is invading home life and stealing leisure time. A further observation was that whilst the computer had given participants the flexibility to choose their work location, some were becoming more inactive as there was less need for physical interaction.

Barbara talked about how meeting up with social groups was facilitated by the laptop, in that she could take the computer with her to meetings. The advent of the internet has meant that she no longer needs to travel to meet up with the groups, and she communicates with these groups through social media. This in turn means now she is no longer restricted to groups she can meet with physically, and her network has expanded to international forums. Not only has the internet '*propelled [her] business to an international stage'* it has given her the freedom to consider relocation to other parts of the World. She talks about digital nomads that travel the world with their laptop and have no base; she says she is more of a lifestyle entrepreneur in that she has decided where she wants to live in the world and is building her business around that. All of her *'Tribes'* and groups are online so she no longer needs to be within commuting distances; they do *'Zoom'* calls and virtual meets. She says she does not even need to go to London anymore. Barbara says that a lot of her work is coming from Canada so this is creating issues in terms of time frames in that she will be getting to the end of her day and many of her customers are just starting theirs.

Giselle is currently recruiting for an American company and has business conversations in the evening. She does not have to stay in the office to do this because she can work from home.

Gabby believes not having a computer would make her feel left out and isolated. She travels a lot for work, so if she did not have computers she would feel *'really out of the loop'*.

Whilst opening up an international forum for networking and building professional relationships, the computer has also increasingly isolated others. Barbara says that's because she can communicate with anyone anywhere, she no longer needs to step foot outside the house and she is 'going out less and less'. She said she has caught herself excusing herself from social activities because she *'has to do this or that'* on the computer and she has not done any real face to face socialising for some time. She recognises that physically being with someone is completely different to talking to someone over the computer but says she is very positive about her online support systems. She says that she is a member of a female entrepreneur association with accountability partners, mentors. She refers to her strategy call with her mentor that morning. Her mentor lives at the other end of the country. She says the group challenges members to do something big each month. It was because of the support and encouragement from this group that she learnt to build websites. She says she built three in three weeks. She is spurred on not only by people cheering her on, sharing solutions to problems, and offering advice, but also talking about what they have achieved through this network of female solidarity. She has a virtual assistant helping her with her business. She said she is *'tired of doing everything on line and not having a physical person to work alongside'*. She is currently actively looking to recruit a personal assistant to work alongside her in the same physical space.

Computers are, for Belinda, restrictive because *'even though you don't mean to, you are constantly having a look' at your tablet and phone'*. She has a work laptop and was given an iPad which she stresses was bought for her socially as a present and nothing to do

with work, but she still has work emails running through it. She also has a phone. Belinda thinks computers are *'a good invention'* but through it she thinks *'we've lost the art to socialise'* because so much of our life is now devoted to screen time.

Barbara said she was once a very active person, but finds herself more and more adopting a sedentary lifestyle. She observed that she is doing something she swore she would never do in that she will be using her laptop whilst watching a film on TV with her phone close to her side. Her international customer base is extending her working day, with customers in different time zones pushing the parameters and blurring the boundaries of when she starts and finishes work. She says she manages this by taking a complete rest at weekend and sometimes she doesn't turn her computer on at all. She says some people think there is a distinction between their life and work; for her she is doing what she loves. This makes it difficult for her to shut off and she says she has to be super controlling at times and she will take a break from her work and do the cooking and cleaning instead. She does not see her life style as having an expiry date - she has hit the menopause and is feeling more energetic than ever. She says she may take time out from time to time and have other people helping her but she has no intention of stopping. Her professional life defines her and she is not concerned that it encroaches on her personal down time.

Betty once managed 11 magazines and 90 people and worked in a very vibrant and dynamic environment in close proximity to her colleagues. Now she is just a one person show. She does everything herself. She says she knows she does not work as hard as others, but even as we speak she is sat right in front a computer and never stops *'except running up and down stairs to try and recreate actually moving in an office'*.

Betty was asked what she would call her computer if it had a name. She said *'lifestyle'* because it enabled her lifestyle where she can go on holiday and as long as he has

access to the internet, can still be earning money. Betty says that she does not have much time for holidays but she is going to a crofter's cottage in a few weeks time and determined that use of the computer there will only be two hours work each day.

For Bianca, the computer is a source of conflict between her and her 28 year old daughter: *'I can't be doing with people who are permanently looking at their phones because it is pinging all the time. It's like 'for goodness sake just live your life''.*

Brittany says she will wake up in the middle of the night and check her emails.

Gabby admitted to be using her laptop whilst carrying out the interview and mentioned that her boss was emailing her whilst we were talking.

Georgia notes that she spends nearly all her day on the computer, using Google maps to figure out how candidates can get to jobs, check out companies on the internet and book a holiday:

> *'So pretty much I would say the majority of my life at work is on the computer and then its not just computers because you've got your phone and you've got your iPad and whatever else. So pretty much, technology, you're on it all the time'.*

Geraldine says she prefers her laptop over her phone, because she can turn it off and put it away: *'It doesn't peck at me all the time whereas my phone will constantly buzz'.*

Giselle thinks one of the big changes in the recruitment industry as a result of computerisation has been *'agile working'* and the *'the ability to just work off site when we want to'*. There is no longer a need to be in the office to do her job. If she wants to enjoy the sunshine for a few hours, she can do that and log back on later.

Gladys thinks she would have given up her role many years ago without a laptop as it has made her workload manageable. There is no longer a need to be physically on site and when she does travel her computer travels with her so she can keep on top of things. Gladys said she at one time was using a computer about 20% of her work life and spending

much more of her time travelling. But now she is using a computer around 80 to 90%. Her working life has changed as a result and instead of going out and meeting people she is spending much more time sitting behind a desk. She thinks that most of her time she is behind a desk.

Glennis describes her laptop as *'a double edged sword'*. It means she can now work off site, but also there is *'the temptation to carry on working instead of leaving work behind you'* when you go home.

Griselda says that computers originally tied people to desks but portable technology has come at a time when flexible working is acceptable. She says that technology now allows flexible working, and at the same people are *'learning to trust their staff'*. Simply because employers are not able to watch over their staff all the time, they need to believe they are carrying out their role without being constantly monitored. She does a lot of her marketing from home and a lot of her coaching is over Skype.

Marcie says the workplace is so much more stressful in that she is expected to check emails as they come through.

Myrtle says that there is a VPN at work so she can dial in from *'pretty much anywhere'*. There are 81 sites so she carries on working wherever she is. *'Sometimes that's a good thing',* she says, *'sometimes not so good when it's Sunday night'*. Myrtle thinks that when you are on holiday your emails should just get deleted. *'You shouldn't have to come back to 300 emails'*. Myrtle thinks, particularly with smart phones, we are getting sucked in to working 24/7. She says her colleague has work emails coming through to his personal phone, so *'he can't help but answer them'*. Myrtle has a work phone and a personal phone so she can just turn off her work phone out of hours. She says there is not a day that goes by when she is not on a computer or a smart phone or a laptop. She says it

is quite sad. Myrtle thinks she would manage without computers, but would struggle in finding information as she no longer has encyclopaedias. Her favourite computer is her laptop because she can just pick it up and take it with her.

In summary, the computer as a liberator was symbolically relevant to all cohorts, but mainly pertinent to Baby Boomers and Generation X who were more conscious of the changed presented by advances in technology such as wifi and the internet. For Millennials, there has always been portable computers and accessible internet. There was a suggestion that the freedom to work anywhere anytime was becoming an entrapment as the work infiltrated personal time and new found stresses are arising, but for the majority, the computer was overwhelmingly a symbol of freedom. The freedom presented by the computer was in various forms, but once again, the liberator was without gender.

What is the symbolic meaning?	The computer is seen as a symbol freedom
Has this symbolic meaning changed over the last 50 years?	Technical developments mean this symbolism is relevant only to the latter part of the period being studied.
Is there a correlation between the symbolic meaning and age of the participant?	The symbolic attachment is relevant to participants from all generational cohorts but primarily Baby Boomers and Generation X who are more conscious of the change presented by technological developments.

Figure M - The computer as a symbol of freedom

4.5 THE COMPUTER AS AN INDEPENDENT ENTITY

The preceding sections have considered the symbolic meaning of the computer for women office workers. It has been suggested that the relationship between a computer and user is sufficient for a computer to take on meaning beyond that of a symbol, indeed for the computer to be accredited with independent agency by the user. Guthrie (1993, p.78) and Looft (1969, p.12) suggest we are continually drawing analogies between the human and the non-human in order to make sense of the world and Stack (1980) refers to our need to make it a friendlier place by perceiving social relationships with the inanimate.

Participants are very fond of computers because they held memories. Marie still has her first laptop *'in her bedroom down the side of her shoe rack'*. It contains a lot of her memories - photos and stories she has written, a very personal memento she is reluctant to part with.

Gabby says she is in *'love'* with her Apple devices and says she could not be without her iPad and iPhone. She feels they have had a beneficial impact on her wellbeing. This is because it is easier for her to access information and emails and also because when she is anxious or having negative thoughts she can use the music or play games.

Participants were asked if they *'blamed the computer when things went wrong'*. In other words, did they accredit the computer with an element of will and ability to interfere in their lives. The majority denied this, however, Barbara admitted that she blames her laptop when the power supply fails and it closes down without saving her work, but says only for a brief time as she is aware it is just a machine. Having said that she does say that laptops are *'sensitive'* so much more so than PCs and that *'you have to be a little careful with them at all times'*.

Technology is very important to how Brittany deals with everything and how she works and she rationalises her reaction to situations where she perceives a lack of control. She does not blame her computer if things goes wrong, but will get very frustrated because she does not understand why it does not work.

Gloria says she gets very frustrated when computers do not work. She was preparing a PowerPoint presentation and went to print and did not have any print cartridge. She said she did not blame the computer but she did blame herself for buying a cheap printer. The computer was innocent: it was her error. She admits she did blame the computer when the power tripped and she had no idea why. She has rationalised a break in power but at the time considered another entity to have control over the situation.

Gabby admitted that she blamed her computer when things went wrong as she was unwilling to accept responsibility for the error. She recalled a time when she was writing a dissertation and she lost the work. She said she wanted to fling the computer through the window, but was glad she did not because she might have damaged the computer.

Geraldine says she knows it is always computer error, but admits that she recently posted on Facebook a plea for help on her computer threatening to take a hammer to it.

Gladys says that she repeatedly tells people *'the computer is only as good as the person using it'* but despite this rationalisation admits that she will blame it from time to time.

Glennis similarly says that ultimately computers go wrong because the user has done something wrong. She says however that blaming the computer is useful to give a person *'an out*' saying it is:

'really helpful to stop making people feel less stupid when you are chasing things and you say I am not sure if it came through or not when you know they didn't send it. They say the computer's been playing up recently and my emails have not been working' and then they 'resend' it'.

Greta says she was applying for a role for a job she really wanted. She *'didn't save the document and threw the laptop down in temper and broke the screen'.* This cost her money to repair and she considers this an appropriate sanction in response to her reaction.

Geraldine said that computers of the 90's didn't break down much *'or if they did you used to smack them or give them a kick and it would get working again',* smacking, perhaps, like a naughty child?

Griselda does not blame the computer when things go wrong: *'someone programmed the computer to behave that way...it's not evil and it doesn't have a personality. It's just a thing'.*

Myrtle says she definitely blames her computer when things go wrong. *'It crashes'* on her a lot, and she was particularly frustrated when trying to submit assignments for a course she was studying.

Myra says she would never blame a computer. She says that if a person doesn't understand how a computer works, they might blame it, but *'when you work with them a lot you soon learn to realise they only do what you tell them to'.* In other words, the more you know why a thing reacts a certain way, the less likely it is to think that it chooses to react that way.

Myra talks about her first laptop, which is a treasured memento of her youth and contains scripts and plays she wrote as a teenager. It's *'dying a death'* but she will not *'get rid of it'.*

Meg does not think she would be able to live with computers. *'They are your friends'.*

Van Oost (1992) refers to the fear of the power represented by machines accredited with the capability to act independently by people who did not understand how they worked. Examples of the computer as a symbol of power were more common with Baby Boomers than Generation X, and perhaps correlated with the size of the computer. Baby Boomers spoke of mainframes as deified entities in dedicated environments separate from the workplace. Millennials were more familiar with hand held devices and easy to access controls.

The computer as a deified entity or alien being, something separate and distinct, was communicated by Barbara who recalls that there was *'a whole room dedicated to the main frame computer'* at work. Whilst she said it was *'laughable'* that the computer took up a whole room she refers to people being employed *'to take care of it all'* alluding to the ongoing needs of a living entity. There was mystery attached to the computer in that she was '*on the frontline and didn't know how it all worked'* suggesting that knowledge was the elect of the privileged elite.

Beatrice talks about her interactions with a mainframe and says how important that the punch cards she used were in the right order, pseudo-ritualistic, otherwise the computer would not work. She laughs when she says the cards were stored in shoe boxes and kept together using elastic bands, contrasting the sophistication of the computers with the rudimentary storage devices, perhaps suggesting that the religious artefacts used for communicating with deified beings deserved a greater reverence. Beatrice says *'the cards were made by special typewriters that looked like typewriters but weren't actually typewriters'.* She was attempting to understand the unfathomable by drawing comparisons

with objects she was familiar (Marakas, Johnson and Palmer, 2000, P.737) but accepting that they were not part of her world. The contrast between the special and mundane, the mysterious and the pragmatic was very much a feature of her introduction. She described a dirty and noisy environment, one in which she was not comfortable, and the computer was *'something alien'*. She said she spent hours putting the cards in the right order, analogous to tediously going through a ritual to appease an alien entity. Beatrice reflects on how the main frame *'looked really alien to everyone'* but that nowadays the computer is not alien and that it is now part of her everyday life.

Georgia says that she didn't use computers a lot at school but they were *'just like really alien'*. She says she is not frightened of computers, but is frightened of getting a new computer because she is frightened she won't be able to fit all her information on a new machine. She is also frightened because there will be things she does not know and will have to learn. She is frightened of being in situations where she does not know the answer and is consequently rendered powerless.

Geraldine laughs about the Millennium bug when *'we were all going to blow up and computers were going to blow up to,'* somewhat cynically decrying the importance given to computers. She is, however, wary of them. She talks about the *'crazy'* pace of change having recently read an article in which talked about computers taking *'over things like accountants and roles like that'*. She continues *'its quite a scary old world to think that we are going to be taken over by computers but we are not going to have enough people out there to sort of fix them'*. She does not think it will be long before computers take over as everyday there are new advancements. For Geraldine, computers:

> *'...control everything...from a career point of view, from a working practice point of view, they literally control everything. It's everything from how to buy your groceries to determining what sex of the baby you are carrying when you are pregnant. I am sure there are computers out there that can predict the day that you*

die....it would be scary world to think if the worse did happen and computers didn't work the world literally wouldn't know how to function any more'.

For Geraldine, the computer is a superior power with too much control over her life. Pringle (1989, p.177-180) suggests the computer may be interpreted as an extension of the power held by men but Geraldine's account does not suggest the power is engendered.

This section examined the potential for computers to symbolise independent agency or have meaning beyond the symbolic and be held as an empowered artefact able to make decisions and exert control over the user. Whilst there were examples of participants developing attachments to computers, and blaming them when things go wrong, and examples of computers being accredited with independent agency, there was no definite anthropomorphism. Accounts by Baby Boomers of their interaction with mainframes suggest that the grandeur of these awe inspiring machines led to some sort of deification. It is not obvious, however, that the computers were engendered, merely that they were superior and held power over the participant.

What is the symbolic meaning?	The computer as a symbol of independent agency
Has this symbolic meaning changed over the last 50 years?	The power to make decisions and take actions independent of the user is relevant to mainframes as to PCs
Is there a correlation between the symbolic meaning and age of the participant?	The symbolic attachment was relevant to participants across all generational cohorts

Figure N - The computer as a symbol of independent agency

5.0 CONCLUSION

5.1 INTRODUCTION

This study examined the symbolic connotations of the computer held by women who had worked the majority of their career in the office. The qualitative study, employing a narrative method in a symbolic interactionist phenomenology, was with a view to identifying the symbolic meaning of the computer, to consider whether that symbolism has changed over the last 50 years, and to look at the existence of any correlation between the symbolic meaning and age of the participant.

A deductive analysis was carried out on data collected through narrative interviews of a cohort of participants categorised by way of three generational cohorts. Pseudonyms were used to preserve anonymity. The data was transcribed and then analysis carried out using manual coding systems, with narratives being contrasted and compared. This final chapter summarises the findings and considers the implications of the research,

5.2 THE COMPUTER AS MORE THAN JUST AN ARTEFACT

5.2.1 The computer as a social product

In relation to the theoretical framework underpinning the computer as a socially constructed product, comprising an artefact, processes, rituals, skills and knowledge (MacKenzie and Wajcman, 1985, p.3; Lie, 2003, p.21; Garud and Rappa, 2009, p.346), the computer and the ability to type were inextricably combined. Being adept in using a computer necessitated skill in typing. Associations between typing and the role of office worker were apparent. For Baby Boomers, there was a strong association between typing and secretarial work: a participant learnt to type at secretarial college, another refused to

pass her typing exam because she did not want to be a secretary, and a third initially resisted learning to type when she was setting up her business and would get *'the girls'* in reception to type for her. The link between computer, typing and the secretarial role identified in narratives by Baby Boomers suggests the computer itself was imbued with symbolic connotations of subservient activity. However, Baby Boomers referred to past roles as secretaries. They did not currently identify themselves as secretaries: they were building websites and running businesses. The narrative therefore suggested that the computer may once have been a symbol of subservient activity for Baby Boomers, but this symbolism had since dissipated.

Formal typing tuition was less common for Generation X and a number of Millennials were not clear of how and when they learnt to type. The skill was generally acquired through play or early school years by Millennials. There tended to be no formal structure to the teaching or assessment of the skill for this cohort, and this fact in conjunction with computers being present in various guises throughout their life, meant that typing was a life skill acquired as naturally as walking and talking. Whilst pride was expressed in being able to type fast - similar to the pride someone might have in being able to run fast, Millennials did not hold reverence for the skill of typing. It was a rudimentary activity. They also had little experience of the archetypal secretary reporting to a male boss and therefore the symbolic connotations of subservience in relation to the act of typing were not relevant.

Whilst *typing* might hold some symbolic meaning for Baby Boomers, for Generation X and Millennials it was just a means to an end. The computer may once have been a symbol of subservient activity for Baby Boomers, but no longer is.

5.2.2 Society as a product of the computer

As an active agent in cultural and social development through a technological construction (MacKenzie and Wajcman, 1985, p.4) and co-construction perspective (Garud and Rappa, 2009, p.345; Cockburn and Ormrod, 1993), there was substantial evidence that the computer had made an enduring and significant impact, particularly in relation to communication.

The computer has enabled geographically wider and more frequent connections, but not all participants considered these connections to be valid social relationships. Some participants talked about '*friends'* they had collected, but knew little or anything about. There was a fear that interpersonal skills were declining as a result of overuse of social media. A participant made a New Year's resolutions to abstain and others were taking social media holidays in the hope of regaining social skills and restoring relationships. This concern was common to all generations.

Communication through social media was for some a good way of keeping in touch with people, but it was introducing new risks and concerns such a cyber bullying, trolls and data theft. Only one participant was vehemently opposed to social media involvement, despite having been contacted in relation to the study via LinkedIn. It was the concept of social media that was the issue for participants and not the computer per se, but as rituals and processes in the use of technology, they might be argued as 'forged' together (Lie, 2003b, p254).

Participants were clearly communicating *through* the computer as opposed to *with* the computer (Turkle, 1997, p.60), although the communication process was becoming a one way affair in relation to social media for some participants. There was some evidence of the social media platform as a stage to present to an invisible audience, with participants

posting messages and images to collections of friends that they knew only vaguely, if at all. Some were conscious of their presentation and persona, adopting different communication styles and using different content for different apps, perhaps as actors playing different characters in a theatre production. For others, this ability to adopt another identity was placing a greater emphasis on the importance of integrity.

The computer was obviously a symbol of social connection for all generations. It enabled global networking and fast and easy communication. Baby Boomers had experienced a time before computerised communication and were aware of a significant change in social interaction. There were concerns expressed in relation to the impact communication through the computer was having on communities and social skills. The computer was a symbol of deterioration in interpersonal skills primarily for Baby Boomers. This was less of a concern for Generation X and Millennials who were not able to so easily compare their current modes of communication to a time before the computer. These two generational cohorts were, however, aware of the risks, ether anecdotally or through direct experience, of over connection: people were openly communicating views to a public audience that should have been kept private; children are able to access information that they should be protected from; and third parties were penetrating the safe haven of home life as cyber bullying and trolls. The computer as a symbol of over connection was recognised by all generational cohorts, but particularly Millennials and Generation X.

5.3 THE COMPUTER AS AN ENGENDERED PRODUCT

5.3.1 Engendered by 'institutional actors'

As a passive engendered symbol, there were few examples of the computer being designed by men for men (Berg and Lie, 1995, p.340). Participants had multiple computers in their lives, and the majority owned at least a smart phone. Participants spoke about computers owned by male family members, but reeled off lists of computers owned by them with equal ease.

Berg and Lie (1995) suggest that women fear technology as it is not designed with their requirements in mind. This was evidenced in narrative from Brittany who talked about a fear of something she did not understand. However, she was determined to conquer the computer and is now reliant on it. Despite her dependency, she maintains she is completely in control of the computer and the computer does not have power over her.

The was a wide understanding of the Apple v PC debate with Generation X and Millennials which further demonstrated the material value placed on the computer, but there was no evidence of engendering.

Computers were a symbol of prestige, success and hardwork for participants. It might be suggested that prestige and success are masculine traits, but there was no suggestion of engendered symbolism of these traits in relation to the computer.

5.3.2 Engendered by practical application

Engendering of the computer through association with particular users (Lie, 2003b, p.261; Gansmo, Lagesen and Sørenson, 2003, p.57) was suggested in narrative from a number of participants. Computers were associated with fathers, brothers and sons. They were also associated with family activities and strong female role models. The data

provided by Griselda is of particular interest in relation to this theme as her father was an IBM field engineer who took his daughter out at weekends whilst on the job. Whilst there was a clear association of the computer with her father, and she studied languages because that was her passion, she found computers *'easy'* and became head of IT for one employer. Whilst the computer might be a symbol of her father and may be engendered as a consequence, it did not appear to inhibit her in her professional advancement. It might be argued that it instead had a nurturing affect.

Martha, in contrast, had strong associations of the computer with family arguments and her step father. She avoided computers in her professional life and it is only recently that she has started to use and become confident with computers.

There were examples of strong female role models with a passion for computers, but these role models did not necessary inspire a career in computers.

Generation X and Millennial participants appeared to hold memories of computer use predominantly in the home environment. For Baby Boomers, early memories were at secondary school, or university or in the office.

Generally the computer was a symbol of 'family' for Generation X and Millennials.

5.3.3 Engendered by its users - the 'computer geek'

The 'hacker impact' and 'geek mythology' (Lagesen, 2003, p.71; Margolis and Fisher 2003; Gansmo et al, 2003) were evident from accounts of a number of participants. It was however the activity of coding or gaming that was engendered, and not computer use itself (Corneliussen, 2003, p.111). Some aspect of computer use, such as information processing, website construction and social media communication were actually seen as feminised activities. Coding has numerical associations, and two participants talked about how they had been persuaded away from maths, despite an aptitude. Others had a clear

aptitude for maths but preferred language and communication. There was suggestion by one participant that the IT team had developed their own language deliberately to exclude other (female employees), and being able to converse in that language gave her an advantage in the workplace. The general theme was that the options were to work with computers or work with people, although many of the participants were now working with people through computers as communication devices. Particular for Baby Boomers, there was an acceptance that women '...*pushed the buttons but [did] not meddle with the works' (*Cockburn, 1985, p.11), with programming viewed as uninteresting and the antithesis of working with people.

Participants used computers used for communication, but computers use for programming or gaming was a symbol of male technical prowess. This was an enduring symbol shared across all cohorts and including participants who were competent mathematicians. It was not the computer that was engendered, it was the activity.

5.4 THE COMPUTER AS AN ACTIVE AGENT

5.4.1 Replacing the workforce

In terms of the computer as an active agent, emphasising the gender divide as a symbolic representation of male superiority, there was evidence that computerisation had led to job losses (MacKenzie and Wajcman, 1985, p.4; Spilker and Sørensen, 2003, p.229). However, there was little resentment expressed by participants in relation to this, possibly because the participants were survivors of the cull as a result of their computer prowess. The computer may therefore have represented an advantage to them in their career development. Rather than being viewed as a symbol of a male regime culling a female

workforce, the computer was seen as a gender neutral symbol of efficiency by Generation X and Millennials.

5.4.2 Deskilling the workforce

In relation to deskilling, one participant suggested that the computer had lead to a decline in the number of people who could draw (Wolff, 1980, p.58). There were also concerns expressed by participants in relation to a decline in interpersonal skills (5.2.2). Generally, however, participants linked computers with the acquisition of new skills, new learning and career progression. Notable were the references to Google which is seen as a tool for acquiring knowledge and skills in a wide range of subjects. The computer was seen as a symbol of learning and knowledge by participants from all generational cohorts.

5.4.3 Dividing the workforce

There were anecdotes from participants in relation to a *technology for boys* theme, although these were generally from Baby Boomer and Generation X participants (Gansmo, Lagesen and Sørenson, 2003, p.38). Bonnie talked about a managing director who refused to allow male managers to use computers, and Gloria talked about typing for girls only (Davies, 1982, p.55). Griselda was clear in her understanding that boys were encouraged to play with computers and girls were encouraged to play somewhere else, and Gigi worked on a project where men did the technical stuff and she trained the users.

Another divide that became apparent stemming form the computer is in terms of age. Adeptness with technology was generally associated with youth. Bonnie, however, believed that her experience placed her at an advantage over younger colleagues, as did Glennis, who could recognise the dial up tone to the internet, something she believed teenagers could not. The age divide associated with computers was not, however,

attributed to some malevolent power utilising computers to divide and conquer women, and there was no suggestion of masculine symbolism.

The computer is a symbol of division. It separates people. Whilst the computer is a symbol of the partition, it is not, however, a symbol of the other side, and presents as a neutral dividing line rather than a barrier. The computer is a symbol of the divide between genders, but is not seen a symbol of men excluding women.

5.4.4 Liberating the workforce

In terms of the computer as a liberator (Wajcman, 2007, p.287), this had many guises. The computers has released Belinda from some of the drudgery of creating professional looking documents; released Betty from the shackles of the office by allowing her to work from home; and become a symbol of freedom for Barbara who values her laptop, which she can take from place to place but chooses not to. Brittany values her iPad which she can move around and move money wherever she is, and, for Georgia, the computer has given her the freedom to start her own business. For Glennis it has given her the freedom to learn from anywhere, and also the freedom to iron without bringing her iron to the computer. Portability aided by lighter and more compact design and the advent of the internet and wifi are obvious reasons for the computer to symbolise freedom. This is connected to the freedom to access the global arena and form international relationships without leaving the office for several participants.

Conversely, participants spoke about the restrictions placed on them and the invasion of the home space by the blurring of work and work life boundaries as a direct result of this flexibility. As Glennis put it, *'the temptation to carry on working instead of leaving work behind you'*.

Participants were also building confidence in their independence with the support of female solidarity gleaned through online communities (Banyard, 2010, p.211). Barbara talked about online mentoring and coaching, and Griselda referred to her online communities as 'Tribes'.

The computer was clearly a symbol of freedom, and as such relevant to all generational cohorts. Baby Boomers and Generation X were most aware of the liberatory impact of the presented by advances in technology such as wifi and the internet and for that reason, the computer as symbol of freedom was more predominant amongst those cohorts.

Excessive freedom is becoming an entrapment as the boundaries between home and work dissipate, and this is creating new stressors, but this had not overly sullied the computer's symbolic value as liberator.

Whilst the freedom presented by the computer took on various guises, in all cases, the symbolic value was without gender.

5.5 THE COMPUTER AS AN INDEPENDENT ENTITY

The final area considered was the potential for the computer to have meaning beyond its symbolic connotations and for it to be regarded as an independent engendered life form (Guthrie, 1993, p.93; Turkle, 1997).

There were definite attachments and strong relationships with computers. The word 'love' was used, they were described as 'friends' and one participant said that a treasured laptop was 'dying'. Participants, reluctantly admitted that they gave the computer some responsibility when things went wrong (Moon and Nass, 1998). Participant generally rationalised their interaction with the computer, considered it a neutral component in a communication process or potentially an object for venting frustration.

. Independent agency might be accredited (Van Oost, 1992) when the computer represents a power over the individual, through ignorance or lack of control and it is possible the concept of power correlated with the size of the computer. Baby Boomers spoke about large computers as deified entities or alien beings.

Geraldine spoke specifically about her fear of computers taking over the world. Pringle (1989, p.177-180) suggests, the computer might be viewed as an extension of the power held by men but Geraldine gave no indication that she considered this power to be engendered.

The computer was for some a symbol of independent agency, but an ungendered one.

5.6 CONCLUSION

It was obvious from the above that the computer holds several symbolic meanings. The main themes identified are the computer as symbol of social connection, of over connection, of a breakdown in communities and of a deterioration of interpersonal skills. In addition, the computer is a symbol of prestige, success and hard work, of family, of efficiency, of learning and knowledge, of division, of freedom and of independent agency. All these themes were gender free. However, the study also found that programming or gaming is a symbol of male prowess. The computer itself is neutral, but certain computer activities are engendered.

The computer as a symbol was evident, but data to support the proposition that the computer was a symbol of masculine supremacy was not existent. Although there were some examples of male symbolism, and the concept of technology was apparently an enduring symbol of masculinity, technology for the majority of participants was what happened behind the scenes. The study did however affirm the conclusion of studies into

the engendered use of computers (Lie, 2003a, p.25). Use of computers for communication was a female thing and the act of communication a symbol of femininity. Use of computers for gaming or programming, however, was a male thing, and use of computers for those activities, a symbol of masculinity.

There was data to support the idea that the symbolism presented by the computer had changed in meaning over the last 50 years. The computer itself has changed in form and function, and as a consequence of this, how participants interacted with it has also changed. *'Alien'* mainframes into which participants fed data to a superior power have been replaced by portable laptops and multifunction smart phones through which we communicate with the World.

Baby Boomers had experienced the most change in form and function of the computer. They could therefore give examples of when they have been in awe of the sprawling mainframe in its air conditioned world screened off from the real world, but now would be accessing Facebook and LinkedIn on a smart phone. Millennials had been born into a world of social media. For them, change in meaning was as a result of their own personal growth and learning as opposed to technological change, with the fun of YouTube being usurped by a need to create a professional persona on LinkedIn.

Some symbolism was shared across all three cohorts, markedly the computer as a symbol of connection. The computer as a symbol of prestige, success and hardwork, as a symbol of efficiency and as a symbol of learning and knowledge, and a symbol of division were meanings also shared across the cohorts. The computer as a symbol of a breakdown in communities and deterioration of interpersonal skills was predominantly held by Baby Boomers. The computer was a symbol of freedom for Baby Boomers and Generation X

whilst the computer as a symbol of over connection and a symbol of family was predominantly shared by Generation X and Millennials

This is a qualitative research study and as such there is no valid opportunity to extrapolate the findings and conclude with some universal understanding of the world. However, from a personal perspective, I have learnt that people can be remarkably open and uninhibited in the information they share with a stranger in the research process, perhaps as easily as they do through social media. I have been privileged to hear some beautiful stories of personal growth and development. Stories based on memories are shaped and reshaped by the passing of time but this study will hopefully go some way to carving these memories into something solid and enduring.

5.7 RECOMMENDATIONS FOR FURTHER STUDY

The study asked what symbolic meaning is held by the computer. Several potential meanings were identified. These meanings could provide the basis for more in-depth study. For example, the computer as a liberator. The computer's role in the deterioration of social skills featured heavily in narratives and the continuing evolution of computers and our society in a co-construction paradigm makes this topic worthy of ongoing consideration.

The intention of this study at the outset was to understand the symbolic meaning held by computers for women office workers with the objective of adding to the body of knowledge that explains the persisting gender divide within the office. This study has concluded that the computer itself is not a factor in this gender divide. The computer is not engendered. It is how the computer is used that is engendered, and exploration into why this is would perhaps be more valid in securing the unfulfilled objective of this study.

6.0 APPENDICES

6.1 APPENDIX A

INFORMATION AND CONSENT FORM

What is the nature of this research?

This independently funded research is being undertaken by me, Alison Norris, a student at Birmingham University. I am inviting women aged18 or over who have worked predominantly in an office environment during their professional career and live in the UK to participate. The research has been approved by the Birmingham University Ethical Committee. This is the data collection stage. The data will be analysed with a view to compiling a report which will be used by me in order to demonstrate I have fulfilled the requirements of the course.

What's required from participants?

This research primarily utilises a method of data collection known as 'narrative interviewing'. This is an in-depth unstructured interview process where the participant is asked to tell a story, with a start, middle and end, about a certain aspects of their life. I will give you an initial outline of the subject (see below) and then there will be little intervention from me thereafter – I will merely record what you have to say and how you say it using a digital recorder, and make a few hand written notes as you talk. You are free to talk as little or as much as you want. I will ask a few questions at the end of the narrative stage to get a better understanding of the story. Once the interview is over, I will go away, transcribe the narrative, do a bit of analysis, and sketch out some preliminary ideas. You can have a copy of all of this, and I will tell you a bit more about the research I am doing. I would be most grateful for your comments at this stage. You can input as little or as much as you want to into this part of the process. You would be welcome to read the final report as well when it's finished. I have around 3 years in which to complete this process.

What are the implications for you?

- Participation is entirely voluntary.
- You can decide not to continue with the process at any stage.
- If you wish to participate, the discussions will be transcribed and digitally recorded.

- If you are not happy with the process, you can withdraw from the study at any time, and the data will be destroyed if that is what you want.

- The risks are mainly that you get so involved, you end up contributing more time that you expected, or that you start talking about personal things that on reflection you would rather not have shared.

So what will happen to the data?

The data will be stored on my computer. It's a laptop that is password protected which is not networked and has up to date security software installed. The information you give me during the interview will be transcribed by me. I will store it in a directory that is created specifically for storing details relating to you. The analysis will be shared with you. Any comments you have to make will be stored electronically, along with copies of any conversations we have over the email, or notes of conversations we have. The data will be analysed by me and shared with my project supervisors, Fiona and Scott. Finally, I will produce a report which I will submit to my course assessors. The project will become the copyright of the University of Birmingham. I will do all I can to obscure your identity in the final report and the data you give me would be stored totally confidentially.

It is possible that some of the data can be used to support academic papers. If this was the case, and there was a possibility you could be identified from the data, I would seek you approval before doing this. The data will remain on my computer for a period of 10 years after the project has been completed and will then be deleted, other than with your permission. If you have any questions about this research, do not hesitate to get in touch:

Best wishes, **Alison Norris**

Mobile:
Email: axn364@bham.ac.uk

Supervisors: Professor Fiona Carmichael and Dr Scott Taylor, University of Birmingham, B'ham Business School, University House, 116 Edgbaston Park Rd, Birmingham B15 2TY

Please sign below to confirm your consent to participate in this research:

I confirm that I have read and understood the information above and have had an opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time without giving reasons. I am aware that whilst every effort will be made to maintain confidentiality of the information I provide, this can only be offered within the limitations of the law. I agree to take part in this study:

Signed: …… Date:…….

Name: ……. [capitals]

Please can I ask you to contribute to this research, as follows: *The computer has been a driver of change in the workplace, shaping job content and work process over the last 50 years. When I refer to computers, I am referring to mainframes, PCs, laptops and tablets. What I am really interested to hear about is how computers have influenced you in your career decisions, and how computers have supported your professional development, and what influence computers have had on your success in the workplace. Please can I ask you to think about what part computers have played and currently play in your working life? It might be easiest if you start with the first memory you have of a computer, described that and tell me all about what happened after that?*

7.0 REFERENCES

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